Centrífuga DE-7200
De Acionamento De
Frequência Variável

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Manual de Manutenção e Operação

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SEÇÃO 1 - INTRODUÇÃO

VISÃO GERAL

Este manual fornece instruções para instalação e operação da centrífuga DE-7200 de Acionamento de Frequência Variável (VFD) (Figura 1-1). O manual está dividido em várias seções para auxiliar o usuário a acessar facilmente as informações. As instruções incluem descrição, teoria de operação, segurança, instalação e manutenção. Desenhos de referência são fornecidos para facilitar a localização e a encomenda de peças, bem como para a compreensão do funcionamento do equipamento e auxiliar na solução de problemas. O manual também contém documentação técnica fornecida por fontes externas. Estes documentos abrangem componentes utilizados na centrífuga, mas não fabricados pela Derrick.

Figura 1-1 DE-7200 Centrífugas de Acionamento de Freqüência Variável (VFD)

SEGURANÇA

A seção 2 deste manual contém informações de segurança pertinentes para tanto operação quanto manutenção deste equipamento. Assegure-se que esta informação seja lida e compreendida por todos os funcionários.

NÃO opere o equipamento em caso de defeito ou falha mecânica ou em componentes elétricos serem detectados.

UTILIZAÇÃO DO EQUIPAMENTO

A centrífuga DE-7200 VFD foi designada expressamente para a remoção de sólidos de lama/pasta de baixa gravidade especifica. Em um tipo de processamento, sólidos são removidos e o líquido é devolvido para recirculação. Alternativamente, os sólidos são retornados para o sistema ativo e o líquido é descartado.

Derrick Corporation não autoriza nenhuma outra utilização para este equipamento. o uso pretendido do equipamento inclui o cumprimento com a operação, manutenção e procedimentos de segurança incluídos neste manual.

DESCRIÇÃO

Os principais componentes da centrífuga (Figura 1-2) consistem no conjunto rotativo; gabinete de controle, motor de acionamento do recipiente e do transportador, sistema de controle, Sistema de Drenagem, interruptor de vibração; e involucro, base, e Estrado. Os parágrafos seguintes descrevem estes componentes.

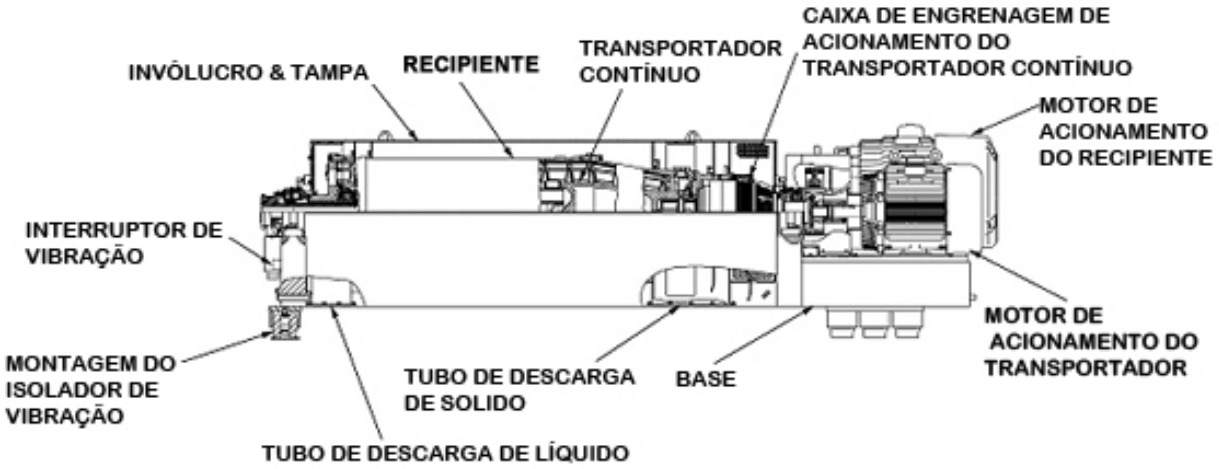


Figura 1-2 Componentes Principais da Centrífuga DE-7200 VFD

Conjunto Rotativo

O Conjunto rotativo consiste em um reservatório de formato cilíndrico, recipiente de aço carbono de alta resistência, conjunto do transportador contínuo, caixa de engrenagens, e componentes relacionados. O Recipiente consiste em um cilindro de metal resistente com uma parte cônica na extremidade de descarga de sólidos e uma parte superior plana no reservatório de líquido na extremidade oposta. Aberturas são fornecidas em ambas as extremidades para permitir as descargas de líquidos e de sólidos. As extremidades do Recipiente são apoiadas por rolamentos de esfera tendo graxeiras para facilitar a lubrificação periódica.

Conjunto do Recipiente

A parte superior do Recipiente de Líquido na extremidade de descarga de líquidos contém placas de bloqueio móveis que permitem o ajuste manual do nível de líquido restante no recipiente durante a rotação. Placas de aparência dentada adjacentes às placas de bloqueio facilitam o ajuste preciso. O Nível de liquido ou profundidade do poço, juntamente com outros fatores, ajuda a determinar o teor de líquidos nos sólidos descarregados. O recipiente cônico na extremidade de descarga de sólidos forma uma praia inclinada para cima, onde os sólidos são coletados e continuamente descarregados através de portas de descarga de sólidos. Pastilhas substituíveis cobrem as portas de descarga de sólidos para minimizar a taxa de desgaste devido à ação abrasiva.

Transportador Contínuo

O conjunto do transportador contínuo é uma cavidade cilíndrica oca, que recebe os dejetos de entrada em seu interior, os dispersa através de bocais de alimentação para o conjunto do Recipiente, e transporta os sólidos para a saída de descarga de sólidos. Girado por um motor elétrico através de uma caixa de engrenagens Planetária de três estágios, o transportador gira na mesma direção que o recipiente, mas a uma taxa de velocidade maior. O involucro exterior da caixa de engrenagem está suportado pelo recipiente, enquanto o eixo é conectado diretamente ao transportador.

A configuração da velocidade diferencial no painel de controle determina a velocidade do transportador em relação à velocidade do recipiente. Esta relação se mantém coerente; assim que a velocidade do recipiente varia, a velocidade do transportador varia proporcionalmente, mas mantem o relacionamento diferencial. Por exemplo, uma velocidade do recipiente de 2000 RPM e uma velocidade diferencial do transportador de 10 tem como resultado uma rotação do transportador de 2010 RPM.

O componente de alimentação na extremidade de descarga de líquidos dirige a lama/pasta adicionada em direção ao interior do transportador, que rapidamente dispersa o material através dos bocais de alimentação dentro do recipiente. Pastilhas substituíveis cobrem as portas de descarga de sólidos para minimizar a taxa de desgaste devido à ação abrasiva. Rolamentos de esfera suportam o transportador na parte superior do recipiente de líquidos, enquanto que na extremidade de sólidos do transportador é apoiado pela caixa de engrenagem de acionamento do transportador.

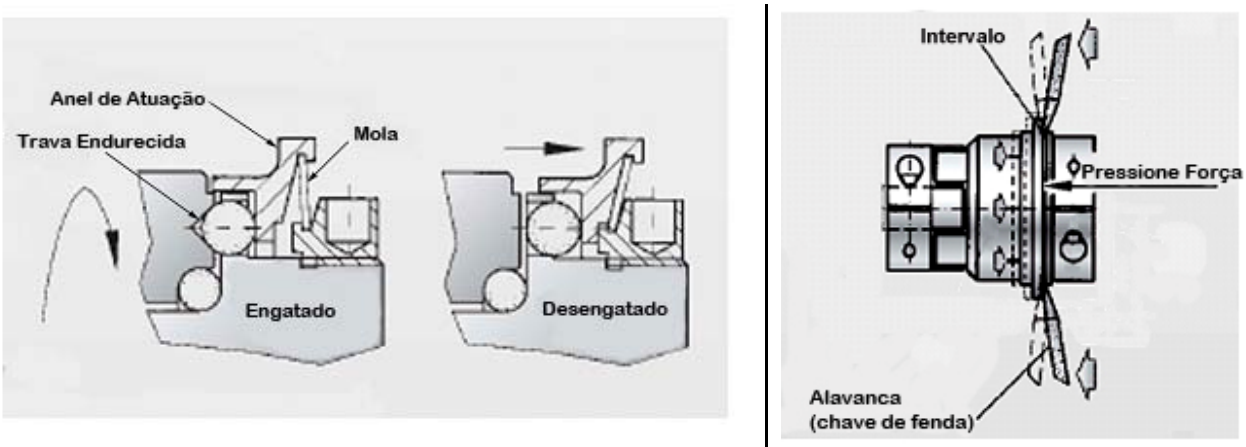
Caixa de Engrenagem de Acionamento do Transportador Contínuo

O caixa de engrenagem de acionamento do transportador é uma caixa de engrenagem planetária de três fases que roda o transportador a uma velocidade maior do que a do conjunto do recipiente. A caixa de engrenagens é montada sobre e consequentemente conduzida pelo conjunto do recipiente, eixos de entrada e de saída da caixa de engrenagem são suportados por rolamentos internos. O motor de acionamento do transportador é acoplado ao eixo de entrada da caixa de engrenagem por um acoplamento flexível, que permita a adesão com leves variações de alinhamento. A caixa de engrenagem contém um sistema de engrenagens que transfere a rotação do motor e do recipiente para o eixo de saída do transportador.

Durante uma condição de sobrecarga, excesso de sólidos no transportador pode sobrecarregar o motor, causando aumento no torque do motor, resultando em um alarme de sobrecarga. Se o limite pré-definido do toque do transportador é atingido, o sistema de controle reduz automaticamente a taxa de alimentação para permitir que o transportador limpe os excessos de sólidos. Quando a centrífuga está operando na taxa de alimentação reduzida, a tela Operacional exibe uma mensagem para informar ao operador o status modificado. Se a condição de excesso de torque não for removida, a centrífuga será desligada automaticamente.

Se subitamente uma condição de toque de sobrecarga ocorrer, a embreagem de acionamento do transportador, mecanicamente desacopla o motor de acionamento do transportador para proteger a caixa de embreagem (Figura 1-3) de danos. Após o desacoplamento, a centrífuga deve ser desligada e a embreagem restaurada manualmente da seguinte forma:

- Alinhe as duas metades da embreagem em uma das marcas no anel de atuação do corpo de areia.
- Insira uma ponta de chave de fenda entre o anel de atuação e ajuste a porca em dois lugares separados por 180°, e pressione o anel de volta a sua posição de engate.



Desengate | **Re-Engatamento**

Figura 1-3 Princípios de funcionamento da Embreagem de Acionamento do Transportador

Motores de Acionamento

A centrífuga é alimentada por dois inversores, trifásicos, motores elétricos à prova de explosão. O motor de 150HP de acionamento do recipiente é conectado ao conjunto do recipiente por uma polia e series de correias de acionamento, enquanto um motor elétrico de 60 HP é diretamente acoplado ao eixo de entrada da caixa de embreagem por um acoplamento da embreagem. Uma guarda protetora cobre as polias, correias de acionamento e acopladores da embreagem de acionamento do transportador para proteção dos funcionários.

Sistema de Drenagem (Apenas Ambientes Perigosos)

Para operação em um ambiente perigoso, o gabinete de controle da centrífuga é equipado com um sistema de drenagem. Um fluxo contínuo de ar vindo do sistema de drenagem previne o acumulo de vapores explosivos no interior do gabinete. Quando a energia é aplicada na centrífuga, o sistema de drenagem do gabinete inicia um ciclo rápido de drenagem de 14 minutos com 16 CFM. Este ciclo é composto de cinco trocas de ar completas. Quando o ciclo rápido de drenagem for concluído, o sistema de drenagem automaticamente fecha um interruptor que fornece energia ao gabinete.

Durante o funcionamento da centrifuga, o sistema de drenagem mantém um fluxo contínuo de ar para fornecer pressão positiva dentro da cabine de controle para impedir a entrada de gases inflamáveis. Sensores de pressão mínima e de fluxo de drenagem fornecem um sinal de saída para o PLC se o sistema de drenagem não mantiver uma pressão satisfatória dentro do gabinete. Para mais detalhes do funcionamento do sistema de drenagem, consulte a documentação de exposição de Tecnologias na Seção 10 - Dados do Fornecedor.

Interruptor De Vibração

O interruptor de vibração (Figura 1-4) é um dispositivo de segurança para proteger os funcionários e equipamentos, desligando a centrífuga em caso de vibração excessiva. Normalmente os contatos do interruptor são mantidos fechados por uma trava magnética. No entanto, vibração forte ou um choque de dois Gs irá sobrecarregar o fecho magnético, fazendo a armadura do interruptor romper com a posição normalmente fechada, fornecendo uma entrada para o PLC. Um botão de restaurar do lado do interruptor deve ser pressionado manualmente para fechar os contatos e restaurar o fecho magnético. O nível de acionamento da vibração é ajustável por meio de um controle de ponto de ajuste, que ajusta o espaço de ar entre o arm-

plate de imã e de trava. Girar o parafuso no sentido anti-horário diminui o ponto definido de vibração em termos de força G necessário para o acionamento da armadura. Quando o controle é girado totalmente no sentido horário, o interruptor acionará no nível de vibração máxima.

O interruptor de vibração fica montado sobre a base da centrífuga em uma orientação que é mais afetada por vibração fora-de-equilíbrio do conjunto do recipiente. Entupimento do transportador ou rolamentos gastos podem produzir vibrações suficientemente elevadas para acionar o interruptor.

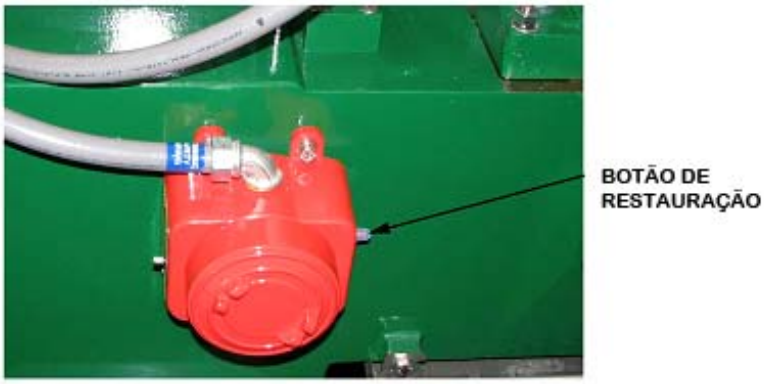


Figura 1-4 Interruptor de Vibração

Invólucro e Base

Quando a tampa do topo está fechada, o invólucro fornece um fechamento de proteção que envolve totalmente o conjunto do recipiente. O tubo de descarga de líquidos e a calha de descarga de sólidos são instalados na parte inferior da metade de baixo. Defletores de contato instalados dentro das metades superior e inferior do gabinete separam os sólidos e líquidos. Parafusos prendem as metades superior e inferior; uma junta na metade inferior sela as duas metades.

O invólucro é parafusado ao conjunto da base de aço soldado, que contém disposições de montagem para os rolamentos pillow block. O conjunto da base suporta os componentes da centrífuga e contém isoladores de vibração de borracha oca que se envolver com pinos de centragem embutidos na plataforma de montagem.

OPERAÇÃO MECÂNICA

A centrífuga recebe lama/pasta na extremidade da roldana (extremidade de descarga de sólidos) da máquina. Para melhor desempenho, a lama/pasta deve ser examinada a 74 micros em máquinas de triagem vibratória antes de passar para a centrífuga para processamento. A lama/pasta flui através de um tubo de alimentação para dentro do recipiente rotativo, onde a força centrífuga separa líquidos dos sólidos. O líquido flui para fora da conexão de descarga de líquidos na extremidade da caixa de engrenagem da centrífuga, enquanto os sólidos são encaminhados para a descarga de sólidos onde eles caem em uma calha na parte inferior da máquina.

A centrífuga é configurada de fábrica para funcionar com uma tensão AC específica de sistema trifásico, em 50Hz ou 60Hz. Controles elétricos são montados na caixa de controle elétrica localizada na extremidade de descarga de líquidos da máquina. Dispositivos de segurança incorporados à centrífuga protegem funcionários e equipamento através do desligamento do

motor de acionamento em caso de pressão excessiva do transportador, alta temperatura do motor, vibração ou outro mau funcionamento.

Forças G produzidas pela rotação de alta velocidade de um recipiente cilíndrico separam sólidos da lama/pasta inicial. O desempenho da centrífuga é baseado em três fatores variáveis:

- Força G exercida sobre o fluido - Força Gravitacional puxando líquido contra a parede externa da centrífuga
- Tempo de retenção na centrífuga - Quanto mais tempo a lama permanece na centrífuga menor a partícula que possam ser separada
- Velocidade diferencial do transportador - Quanto mais rápido o transportador girar mais úmidos os sólidos ficaram e os mais sólidos serão descartados

Todos os três fatores podem ser manipulados para alterar a descarga de líquidos e sólidos. Ao alterar o diâmetro da polia do motor, o RPM do recipiente é alterado. O Tempo de retenção é controlado pelo ajuste das portas de descarga de líquidos na parte superior do recipiente de líquidos para mudar a profundidade do poço (nível de líquido), e a velocidade diferencial do transportador pode ser alterada mudando a proporção da caixa de engrenagem. O transportador opera a uma velocidade inferior à do recipiente, sua velocidade é derivada da proporção de caixa de engrenagem. A velocidade de transmissão é a diferença entre as velocidades do recipiente e do transportador.

O ajuste de qualquer parâmetro—profundidade do poço, e velocidade do recipiente e velocidade diferencial do transportador—requer o desligamento do equipamento. Outro método de alterar os resultados de descarga é mudar a taxa de alimentação.

Durante a operação da centrífuga, a lama/pasta é bombeada através do tubo de alimentação no centro do transportador rotativo (Figura 1-4), onde se espirra contra o acelerador de alimentação. A lama/pasta em alta velocidade é, então, dispersa por quatro bocais de alimentação na periferia do cilindro de transporte. Girando a uma velocidade maior do que a do transportador, o recipiente cria um efeito de corte adicional, que aumenta ainda mais a aceleração da lama/pasta.

À medida que a lama/pasta flui nos canais entre as correias do transportador, as partículas pesadas assentam em um ritmo acelerado devido à força G imposta pelo recipiente rotativo. As partículas de areia assentam quase instantaneamente, em seguida, as partículas mais finas e leves. As partículas que não puderem ser assentadas na configuração atual serão descartadas com o líquido através das barreiras ajustáveis na extremidade do recipiente de líquidos. O líquido saído da parte superior do recipiente de líquidos é dirigido através da saída de descarga de líquidos.

Os sólidos depositados formam um bolo dentro do recipiente e são transportadas pelo transportador contínuo para a extremidade estreita do recipiente (praia). Como os sólidos em toda a viagem à praia, o filme livre do líquido é perdido devido à compressão centrífuga e drenagem. Quando eles são descartados em alta velocidade através das portas de descarga de sólidos no recipiente, eles contêm apenas a umidade adsorvida.

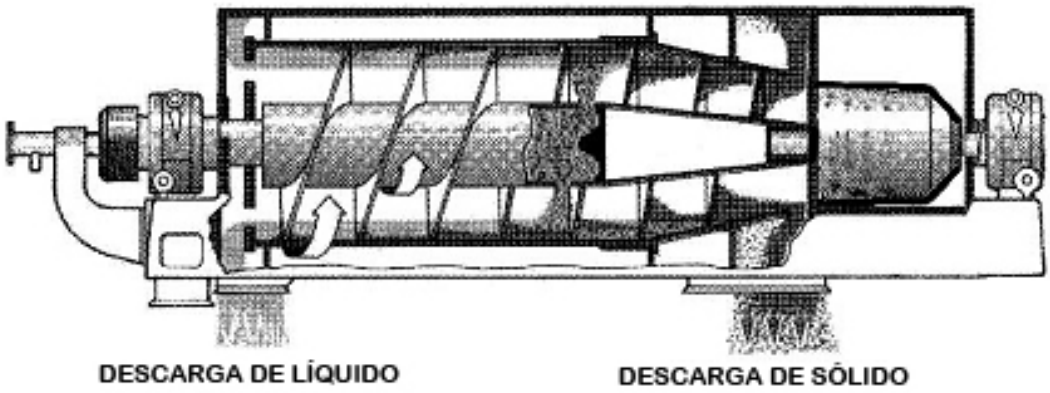


Figura 1-4 Operação da Centrífuga

SISTEMA DE CONTROLE

A operação da centrifugação é supervisionada por um Controlador Lógico Programável (PLC) que interage com os Controladores de Freqüência Variável (VFDs) fornecendo energia para o motor de acionamento do recipiente, transportador e bomba de alimentação. Monitoramento e controle da centrífuga podem ser executados localmente ou até a milhares de quilômetros de distância. O PLC fortemente ambientado também oferece armazenamento de dados de curto prazo e um alto grau de flexibilidade operacional. A interface gráfica montada na gabinete de controle facilita a comunicação com os VFDs e oferece acesso em tempo real às características do sistema operacional. Através do painel de controle, o operador pode inicializar a centrífuga, entrar e ajustar as velocidades do recipiente e transportador, definir taxa de alimentação, e desligar a máquina.

Vários fatores, incluindo temperaturas do rolamento principal, velocidade do recipiente, torques do transportador e recipiente, temperatura do interior do gabinete, e vibração, são transmitidos ao PLC, que então responde com saídas correspondentes para reger o funcionamento da centrífuga. Informações sobre o estado crítico é exibida no painel de controle, bem como alarmes e mensagens de falha, que sinalizam para o operador qualquer mau funcionamento em potencial ou iminente. Qualquer variação excessiva do limite pré-definido faz com que o PLC desligue automaticamente a centrífuga e exiba uma mensagem explicativa sobre a causa do desligamento. Além disso, o desligamento de emergência pode ser realizado pelo operador, a qualquer momento pelo painel frontal.

A bomba de alimentação é totalmente controlada pelo PLC tanto no funcionamento manual quanto na automática. O funcionamento automático proporciona produtividade máxima, visto que a taxa de alimentação ideal é assegurada pelo PLC sob condições operacionais variadas. A alimentação é aumentada automaticamente até o limite pré-definido do torque ser atingido tanto pelo motor de acionamento do recipiente quanto do transportador. Se propriedades da lama/pasta de alimentação mudar, a taxa de alimentação é ajustada automaticamente para manter-se dentro do limite do torque.

INFORMAÇÕES DE CONTATO

INFORMAÇÕES DE CONTATO			
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SEÇÃO 2 - SEGURANÇA

GERAL

Esta seção contém um resumo dos AVISOS utilizados neste manual e uma lista de Fichas com Dados de Segurança do Material (MSDSs) aplicável ao equipamento. A centrífuga foi projetada para desempenhar as funções estabelecidas com segurança.

AVISOS

Todos os funcionários responsáveis pela operação e manutenção deste equipamento devem ler e entender todas as informações de segurança contidas neste manual antes de operar e/ou fazer manutenção do equipamento. Os avisos de segurança listados a seguir são incluídos nos procedimentos aplicáveis ao longo deste manual.

Som

ATENÇÃO! PARA PROTEÇÃO CONTRA PERDA DE AUDIÇÃO, PROTETORES DE OUVINDO DEVEM SER USADOS SEMPRE E POR QUALQUER FUNCIONÁRIO QUE ESTEJA PERTO OU TRABALHANDO EM UMA MÁQUINA DERRICK.

Riscos Eléctricos

ATENÇÃO! PARA EVITAR SÉRIAS LESÕES FISICAS CERTIFIQUI-SE DE QUE O EQUIPAMENTO ESTÁ BLOQUEADO E ETIQUETADO (LOTO), DESENERGISADO, E TENHA PARADO DE GIRAR ANTES DE EXECUTAR AJUSTES E/OU MANUTENÇÃO.

ATENÇÃO! O MOTOR DE ACIONAMENTO DEVE SER OPERADO NA VOLTAGEM DE FORNECIMENTO DESIGNADA.

ATENÇÃO! ALTA TENSÃO PODE ESTAR PRESENTE. TENHA CERTEZA QUE O FUSÍVEL QUE DISCONECTA O FORNECIMENTO DE ENERGIA ELÉTRICA DESTE EQUIPAMENTO ESTÁ ABERTO. BLOQUEI E ETIQUETE (LOTO) O SUPRIMENTO DE ENERGIA PARA PREVENIR APLICAÇÃO ACIDENTAL DE ENERGIA ENQUANTO AJUSTES E/OU MANUTENÇÃO ESTÃO EM PROGRESSO.

ATENÇÃO! CONEXÕES ELÉTRICAS DEVEM SER FEITAS DE ACORDO COM O CÓDIGO ELÉTRICO NACIONAL APLICÁVEL AO LOCAL. FALHA NO CUMPRIMENTO PODE RESULTAR NUMA CONDIÇÃO PERIGOSA QUE PODERIA MACHUCAR ALGUEM OU DANIFICA O EQUIPAMENTO. ASSEGURAR-SE QUE TODAS AS CONEXÕES ELÉTRICAS E DE CONDUITES ESTÃO SEGURAS.

Manipulação do Equipamento

	ATENÇÃO! USE BARRAS ESPAÇADORAS PARA PREVENIR DANOS AO LEVANTAR O EQUIPAMENTO.
	ATENÇÃO! PARA ASSEGURAR O EQUILÍBRIO E ORIENTAÇÃO ADEQUADOS E PREVENIR DANOS AOS COMPONENTES QUANDO A UNIDADE FOR LEVANTADA, SÓ FIXAR AS CORRENTES DE LEVANTAMENTO NOS PONTOS DE ELEVAÇÃO DESIGNADOS. NÃO TENTAR A SUSPENÇÃO POR FIXAÇÃO NO MOTOR OU EM NENHUM OUTRO LOCAL.
	ATENÇÃO! ASSEGURE-SE QUE O DISPOSITIVO DE SUPORTE TENHA CAPACIDADE DE LEVANTAMENTO SUFICIENTE PARA COM SEGURANÇA AGUENTAR O PESO DO EQUIPAMENTO.
	ATENÇÃO! NÃO RETIRAR OS SUPORTES DE TRANPORTE ATÉ QUE O EQUIPAMENTO ESTEJA POSICIONADO NO LOCAL FINAL DA INSTALAÇÃO.

Operação

	ATENÇÃO! TODO PESSOAL DE OPERAÇÃO E DE MANUTENÇÃO DEVE LER E ENTENDER TODAS AS INFORMAÇÕES DE SEGURANÇA DESTE MANUAL ANTES DE TRABALHAR COM O EQUIPAMENTO.
	ATENÇÃO! ASSEGURE-SE QUE TODAS AS TAMPAS SUPERIORES ESTÃO FECHADAS E SEGURAS E TODOS OS FUNCIONÁRIOS FORAM REMOVIDOS ANTES DA MÁQUINA COMEÇAR A FUNCIONAR.
	ATENÇÃO! ANTES DA CENTRÍFUGA COMEÇAR A FUNCIONAR ASSEGURE-SE QUE TODOS OS SUPORTES DE TRANSPORTE FORAM RETIRADOS E OS ROLAMENTOS PILLOW BLOCKS ESTÃO DEVIDAMENTE APERTADOS.
	ATENÇÃO! SEMPRE PERMITA QUE A MÁQUINA DESACELERE ATÉ UMA PARADA COMPLETA ANTES DE ABRIR A TAMPA SUPERIOR OU REMOVER OS PROTETORES.
	ATENÇÃO! NÃO OPERAR A CENTRÍFUGA SE ELA DESENVOLVER BARULHO OU VIBRAÇÃO EXCESSIVA. SEMPRE CONFIRME QUE O INTERRUPTOR DE VIBRAÇÃO E OUTROS DISPOSITIVOS DE SEGURANÇA ESTÃO FUNCIONANDO.

Manutenção

	ATENÇÃO! ALTA TENSÃO PODE ESTAR PRESENTE. SEMPRE ABRA O FUSÍVEL QUE DESCONECTA O FORNECIMENTO DE ELETRICIDADE AO EQUIPAMENTO, E BLOQUEI E ETIQUETE (LOTO) O SUPRIMENTO DE ENERGIA ANTES DE EXECUTAR QUALQUER AJUSTE DE E/OU DE MANUTENÇÃO NO EQUIPAMENTO.

Armazenamento

ATENÇÃO! A CENTRÍFUGA PODE SER DANIFICADA POR SER ARMAZENANDA EM AMBIENTE DE ALTA UMIDADE (MAIOR QUE 50% UR). O EQUIPAMENTO DEVE SER ARMAZENADO NUM AMBIENTE DE BAIXA-UMIDADE.

FICHAS COM DADOS DE SEGURANÇA DO MATERIAL (MSDSs)

As Fichas com Dados de Segurança do Material (MSDSs) para produtos de acabamento externo são incluídas nas páginas seguintes para aconselhar o pessoal sobre as propriedades e possíveis perigos destes materiais. Estes documentos foram elaborados pelos fabricantes dos produtos, que tem exclusiva responsabilidade pela exatidão das informações.

Os MSDSs inclusos estão atualizados com a data de publicação do presente manual e são fornecidos somente como referência. É de responsabilidade do cliente entrar em contato com o fabricante do produto para obtenção dos documentos mais recentes.

Além da documentação do produto final, MSDSs estão listados para outros produtos utilizados no equipamento. Para garantir que a informação atual encontra-se disponível, o MSDS de cada produto deve ser obtido no momento da compra. Note que os produtos equivalentes, para os materiais listados são aprovados por Derrick para as aplicações correspondentes.

DESCRIÇÃO DO MATERIAL - QUANDO UTILIZADO	Nº do MSDS / Data
Tintas	
Devoe Devthane 359 - Top Coat	*359* / 05-06-08
Devoe Epoxy Primer - Undercoat	*313K* / 08-02-04
Lubrificantes	
Rolamentos Principais & do transportador- Shell Albida EP2	*
Caixa de Engrenagem de Acionamento do Transportador - Mobil SHC629	*
Motor de Acionamento do Recipiente & transportador - Chevron SRI # 2	*
Vedação	
Lubrificantes Antigripante Loctite 243 - Fixador	76764 / 09-27-04*

* MSDS não incluída; contate o fabricante para a última revisão.

MATERIAL SAFETY DATA SHEET prepared 05/06/08

HAZARDS IDENTIFICATION (ANSI Section 3)

Primary route(s) of exposure : Inhalation, skin contact, eye contact, ingestion.

Effects of overexposure :

Inhalation : Irritation of respiratory tract. Prolonged inhalation may lead to. Inhalation of spray mist may cause irritation of respiratory tract. Mucous membrane irritation, fatigue, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, abdominal pain, chest pain, coughing, apathy, central nervous system depression, intoxication, anesthetic effect or narcosis, difficulty of breathing, allergic response, tremors, severe lung irritation or damage, pulmonary edema, pneumoconiosis, loss of consciousness, respiratory failure, death. Possible sensitization to respiratory tract.

Skin contact : Irritation of skin. Prolonged or repeated contact can cause dermatitis, defatting, severe skin irritation. Possible sensitization to skin.

Eye contact : Irritation of eyes. Prolonged or repeated contact can cause conjunctivitis, blurred vision, tearing of eyes, redness of eyes, severe eye irritation, corneal injury.

Ingestion : Ingestion may cause lung inflammation and damage due to aspiration of material into lungs, mouth and throat irritation, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, diarrhea, gastro-intestinal disturbances, abdominal pain, visual disturbances, apathy, central nervous system depression, intoxication, anesthetic effect or narcosis, burns of the mouth, throat, stomach, pulmonary edema, loss of consciousness, respiratory failure, death.

Medical conditions aggravated by exposure : Eye, skin, respiratory disorders, kidney disorders, liver disorders, nervous system disorders, respiratory disorders.

FIRST-AID MEASURES (ANSI Section 4)

Inhalation : Remove to fresh air. Restore and support continued breathing. Get emergency medical attention. Have trained person give oxygen if necessary. Get medical help for any breathing difficulty. Remove to fresh air if inhalation causes eye watering, headaches, dizziness, or other discomfort.

Skin contact : Wash thoroughly with soap and water. If any product remains, gently rub petroleum jelly, vegetable or mineral/baby oil onto skin. Repeated applications may be needed. Remove contaminated clothing. Wash contaminated clothing before re-use. Dispose of contaminated leather items, such as shoes and belts. If irritation occurs, consult a physician.

Eye contact : Flush immediately with large amounts of water, especially under lids for at least 15 minutes. If irritation or other effects persist, obtain medical treatment.

Ingestion : If swallowed, obtain medical treatment immediately.

FIRE-FIGHTING MEASURES (ANSI Section 5)

Fire extinguishing media : Dry chemical or foam water fog. Carbon dioxide. Closed containers may explode when exposed to extreme heat or fire. Vapors may ignite explosively at ambient temperatures. Vapors are heavier than air and may travel long distances to a source of ignition and flash back. Vapors can form explosive mixtures in air at elevated temperatures. Closed containers may burst if exposed to extreme heat or fire. Dust explosion hazard. May decompose under fire conditions emitting irritant and/or toxic gases.

Fire fighting procedures : Water may be used to cool and protect exposed containers. Firefighters should use full protective clothing, eye protection, and self-contained breathing apparatus. Self-contained breathing apparatus recommended.

Hazardous decomposition or combustion products : Carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulfur, ammonia, hydrogen chloride, toxic gases, barium compounds. Cyanides.

ACCIDENTAL RELEASE MEASURES (ANSI Section 6)

Steps to be taken in case material is released or spilled : Comply with all applicable health and environmental regulations. Eliminate all sources of ignition. Ventilate area. Ventilate area with explosion-proof equipment. Spills may be collected with absorbent materials. Use non-sparking tools. Evacuate all unnecessary personnel. Place collected material in proper container. Complete personal protective equipment must be used during cleanup. Large spills - shut off leak if safe to do so. Dike and contain spill. Pump to storage or salvage vessels. Use absorbent to pick up excess residue. Keep salvageable material and rinse water out of sewers and water courses. Small spills - use absorbent to pick up residue and dispose of properly.

HANDLING AND STORAGE (ANSI Section 7)

Handling and storage : Store below 80f. Store below 100f (38c). Keep away from heat, sparks and open flame. Store in original container. Keep away from direct sunlight, heat and all sources of ignition. Keep container tightly closed in a well-ventilated area.

Other precautions : Use only with adequate ventilation. Do not take internally. Keep out of reach of children. Avoid contact with skin and eyes, and breathing of vapors. Wash hands thoroughly after handling, especially before eating or smoking. Keep containers tightly closed and upright when not in use. Empty containers may contain hazardous residues. Ground equipment when transferring to prevent accumulation of static charge.

EXPOSURE CONTROLS/PERSONAL PROTECTION (ANSI Section 8)

Respiratory protection : Respiratory protection is required for use in isocyanate containing environments. Consider type of application and environmental concentrations when selecting respiratory protection. Observe governmental regulations for respirator use. (29 CFR 1910.134(OSHA))(Canadian z94.4) The use of positive pressure supplied air respirator is mandatory when the airborne isocyanate concentrations are not known. Note: isocyanate based materials have been determined to cause allergic sensitization in humans. Avoid inhalation and dermal (skin) contact with the uncured material.

Ventilation : Provide dilution ventilation or local exhaust to prevent build-up of vapors. Use explosion-proof equipment. Use non-sparking equipment.

Personal protective equipment : Eye wash, safety shower, safety glasses or goggles. Impervious gloves, impervious clothing, face shield, apron, boots.

STABILITY AND REACTIVITY (ANSI Section 10)

Under normal conditions : Stable see section 5 fire fighting measures

Materials to avoid : Oxidizers, acids, reducing agents, bases, aldehydes, halogens, amines, alkalis, water, peroxides, nitric acid, alcohols, combustible materials, caustics, mineral acids. Nitrates.

Conditions to avoid : Sunlight, elevated temperatures, moisture, contact with oxidizing agent, storage near acids, sparks, open flame, ignition sources.

Hazardous polymerization : Will not occur

The information contained herein is based on data available at the time of preparation of this data sheet which ICI Paints believes to be reliable. However, no warranty is expressed or implied regarding the accuracy of this data. ICI Paints shall not be responsible for the use of this information, or of any product, method or apparatus mentioned and you must make your own determination of its suitability and completeness for your own use, for the protection of the environment, and the health and safety of your employees and the users of this material.
Complies with OSHA hazard communication standard 29CFR1910.1200.

ICI Paints North America 15885 Sprague Road Strongsville, Ohio 44136 EMERGENCY TELEPHONE NO. (800) 545-2643

TOXICOLOGICAL INFORMATION (ANSI Section 11)

Supplemental health information : Contains a chemical that is moderately toxic by ingestion. Contains a chemical that is toxic by inhalation. Contains a chemical that may be absorbed through skin. Free diisocyanate may cause allergic reaction in susceptible persons. Notice - reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Contains iron oxide, repeated or prolonged exposure to iron oxide dust may cause siderosis, a benign pneumoconiosis. Other effects of overexposure may include toxicity to liver, kidney, central nervous system, blood.

Carcinogenicity : Contains formaldehyde, a potential cancer hazard. Rats exposed to formaldehyde via inhalation developed cancer of the nasal cavity. Evidence in humans is limited (nasal and nasopharyngeal cancer). Formaldehyde is listed as a carcinogen by OSHA, probable human carcinogen (group 2a) by IARC, and anticipated human carcinogen by NTP. Overexposure can cause eye, skin, and respiratory tract irritation, and skin and respiratory sensitization. In a lifetime inhalation study, exposure to 250 mg/m3 titanium dioxide resulted in the development of lung tumors in rats. These tumors occurred only at dust levels that overwhelmed the animals' lung clearance mechanisms and were different from common human lung tumors in both type and location. The relevance of these findings to humans is unknown but questionable. The international agency for research on cancer (IARC) has classified titanium dioxide as possibly carcinogenic to humans (group 2b) based on inadequate evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.

Reproductive effects : High exposures to xylene in some animal studies, often at maternally toxic levels, have affected embryo/fetal development. The significance of this finding to humans is not known.

Mutagenicity : No mutagenic effects are anticipated

Teratogenicity : No teratogenic effects are anticipated

ECOLOGICAL INFORMATION (ANSI Section 12)

No ecological testing has been done by ICI paints on this product as a whole.

DISPOSAL CONSIDERATIONS (ANSI Section 13)

Waste disposal : Dispose in accordance with all applicable regulations. Avoid discharge to natural waters.

REGULATORY INFORMATION (ANSI Section 15)

As of the date of this MSDS, all of the components in this product are listed (or are otherwise exempt from listing) on the TSCA inventory. This product has been classified in accordance with the hazard criteria of the CPR (controlled products regulations) and the MSDS contains all the information required by the CPR.

Physical Data (ANSI Sections 1, 9, and 14)

Product Code	Description	Wt. / Gal.	VOC gr. / ltr.	% Volatile by Volume	Flash Point	Boiling Range	HMIS	DOT, proper shipping name
359F65DGF	devthane 359h (no organic haps) derrick green	9.02	291.43	34.96	80 f	208-595	*330	UN1263, paint, 3, PGIII
379C0910	devthane 379 hs converter	9.40	112.85	13.00	135 f	293-293	*321	UN1866, resin solution, combustible liquid, PGIII

Ingredients Product Codes with % by Weight (ANSI Section 2)

Chemical Name	Common Name	CAS. No.	359F65DGF	379C0910
4-heptanone, 2,6-dimethyl-	diisobutyl ketone	108-83-8	1-5	
ethane, 1,1',1''-methylidenetris(oxy)-tris-	ethyl orthoformate	122-51-0	1-5	
acetic acid, butyl ester	butyl acetate	123-86-4	5-10	5-10
c.i. pigment green 7	phthalo green pigment	1328-53-6	1-5	
benzene, dimethyl-	xylene	1330-20-7	.1-1.0	.1-1.0
titanium oxide	titanium dioxide	13463-67-7	1-5	
2-propenoic acid, 2-methyl-, 2-hydroxyethyl ester, polymer with ethenylbenzene, 2-ethylhexyl 2-propeno and methyl 2-methyl-2-propenoate	acrylic polymer	26916-05-2	40-50	
hexane, 1,6-diisocyanato-, homopolymer	aliphatic polyisocyanate	28182-81-2		90-95
formaldehyde	formaldehyde	50-00-0	LT .01	
c.i. pigment yellow 42	yellow iron oxide	51274-00-1	1-5	
acetic acid, 1,1-dimethylethyl ester	tert-butyl acetate	540-88-5	1-5	
butanamide, 2-((2-methoxy-4-nitrophenyl)azo) -n-(2-methoxyphenyl)-3-oxo-	pigment yellow 74	6358-31-2	1-5	
solvent naphtha (petroleum), light aromatic	light aromatic solvent naphtha	64742-95-6		1-5
1-butanol	n-butanol	71-36-3	1-5	
propanoic acid, 3-ethoxy-, ethyl ester	ethyl 3-ethoxypropionate	763-69-9	5-10	
sulfuric acid, barium salt	barium sulfate	7727-43-7	1-5	
castor oil	castor oil, raw	8001-79-4	10-20	
hexane, 1,6-diisocyanato-	hexamethylene diisocyanate	822-06-0		.1-1.0
acetic acid, c6-8-branched alkyl esters	oxo-heptyl acetate	90438-79-2	1-5	
benzene,1,2,4-trimethyl-	pseudocumene	95-63-6	.1-1.0	1-5
anti-settling agent	anti-settling agent	Sup. Conf.	1-5	
polyamide	rheological additive	Sup. Conf.	1-5	

Chemical Hazard Data (ANSI Sections 2, 8, 11, and 15)

		ACGIH-TLV				OSHA-PEL				S.R. Std.	S2	S3	CC					
Common Name	CAS. No.	8-Hour TWA	STEL	C	S	8-Hour TWA	STEL	C	S					H	M	N	I	O
diisobutyl ketone	108-83-8	25 ppm	not est.	not est.	not est.	50 ppm	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
ethyl orthoformate	122-51-0	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
butyl acetate	123-86-4	150 ppm	200 ppm	not est.	not est.	150 ppm	not est.	not est.	not est.	not est.	n	n	y	n	n	n	n	n
phthalo green pigment	1328-53-6	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
xylene	1330-20-7	100 ppm	150 ppm	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	y	n	n	n	n
titanium dioxide	13463-67-7	10 mg/m3	not est.	not est.	not est.	10 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	y	y	n
acrylic polymer	26916-05-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
aliphatic polyisocyanate	28182-81-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
formaldehyde	50-00-0	not est.	not est.	0.3 ppm	not est.	0.75 ppm	2 ppm	not est.	not est.	not est.	y	y	y	y	n	y	y	y
yellow iron oxide	51274-00-1	5 mg/m3	not est.	not est.	not est.	10 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
tert-butyl acetate	540-88-5	200 ppm	not est.	not est.	not est.	200 ppm	not est.	not est.	not est.	not est.	n	n	y	n	n	n	n	n
pigment yellow 74	6358-31-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
light aromatic solvent naphtha	64742-95-6	not est.	not est.	not est.	not est.	500x ppm	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
n-butanol	71-36-3	20 ppm	not est.	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	n	n	n	n	n
ethyl 3-ethoxypropionate	763-69-9	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
barium sulfate	7727-43-7	10 mg/m3	not est.	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
castor oil, raw	8001-79-4	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
hexamethylene diisocyanate	822-06-0	0.005 ppm	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	y	y	y	n	n	n	n
oxo-heptyl acetate	90438-79-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
pseudocumene	95-63-6	25 ppm	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	y	n	n	n	n	n	n
anti-settling agent	Sup. Conf.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
rheological additive	Sup. Conf.	10 mg/m3	not est.	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n

Footnotes:

C=Ceiling - Concentration that should not be exceeded, even instantaneously.

S=Skin - Additional exposure, over and above airborn exposure, may result from skin absorption.

n/a=not applicable
not est=not established
CC=CERCLA Chemical

ppm=parts per million
mg/m3=milligrams per cubic meter
Sup Conf=Supplier Confidential

S2=Sara Section 302 EHS
S3=Sara Section 313 Chemical
S.R.Std.=Supplier Recommended Standard

H=Hazardous Air Pollutant, M=Marine Pollutant
P=Pollutant, S=Severe Pollutant
Carcinogenicity Listed By:
N=NTP, I=IARC, O=OSHA, y=yes, n=no

MATERIAL SAFETY DATA SHEET

prepared 08/02/04

HAZARDS IDENTIFICATION (ANSI Section 3)

Primary route(s) of exposure : Inhalation, skin contact, eye contact, ingestion.

Effects of overexposure :

Inhalation : Irritation of respiratory tract. Prolonged inhalation may lead to mucous membrane irritation, fatigue, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, diarrhea, abdominal pain, chest pain, blurred vision, flu-like symptoms, coughing, sneezing, difficulty with speech, apathy, central nervous system depression, anesthetic effect or narcosis, difficulty of breathing, allergic response, fever and chills, tremors, abnormal blood pressure, severe lung irritation or damage, liver damage, kidney damage, pulmonary edema, pneumoconiosis, loss of consciousness, respiratory failure, asphyxiation, death. Possible sensitization to respiratory tract.

Skin contact : Irritation of skin. Prolonged or repeated contact can cause dermatitis, defatting, blistering, allergic response, severe skin irritation, severe skin irritation or burns. Possible sensitization to skin.

Eye contact : Irritation of eyes. Prolonged or repeated contact can cause conjunctivitis, blurred vision, tearing of eyes, redness of eyes, severe eye irritation, severe eye irritation or burns, corneal injury.

Ingestion : Ingestion may cause lung inflammation and damage due to aspiration of material into lungs, mouth and throat irritation, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, diarrhea, gastro-intestinal disturbances, abdominal pain, visual disturbances, apathy, central nervous system depression, anesthetic effect or narcosis, burns of the mouth, throat, stomach, liver damage, kidney damage, pulmonary edema, loss of consciousness, respiratory failure, death.

Medical conditions aggravated by exposure : Eye, skin, respiratory disorders, lung disorders, asthma-like conditions, respiratory disorders.

FIRST-AID MEASURES (ANSI Section 4)

Inhalation : Remove to fresh air. Restore and support continued breathing. Get emergency medical attention. Have trained person give oxygen if necessary. Get medical help for any breathing difficulty.

Skin contact : Wash thoroughly with soap and water. If any product remains, gently rub petroleum jelly, vegetable or mineral/baby oil onto skin. Repeated applications may be needed. Remove contaminated clothing. Wash contaminated clothing before re-use. Dispose of contaminated leather items, such as shoes and belts. If irritation occurs, consult a physician.

Eye contact : Flush immediately with large amounts of water, especially under lids for at least 15 minutes. If irritation or other effects persist, obtain medical treatment.

Ingestion : If swallowed, obtain medical treatment immediately.

FIRE-FIGHTING MEASURES (ANSI Section 5)

Fire extinguishing media : Dry chemical or foam water fog. Carbon dioxide. Closed containers may explode when exposed to extreme heat or fire. Vapors may ignite explosively at ambient temperatures. Vapors are heavier than air and may travel long distances to a source of ignition and flash back. Vapors can form explosive mixtures in air at elevated temperatures. Closed containers may burst if exposed to extreme heat or fire. May decompose under fire conditions emitting irritant and/or toxic gases.

Fire fighting procedures : Water may be used to cool and protect exposed containers. Firefighters should use full protective clothing, eye protection, and self-contained breathing apparatus. Self-contained breathing apparatus recommended.

Hazardous decomposition or combustion products : Carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulfur, ammonia, aldehydes, toxic gases, barium compounds. Cyanides.

ACCIDENTAL RELEASE MEASURES (ANSI Section 6)

Steps to be taken in case material is released or spilled : Comply with all applicable health and environmental regulations. Eliminate all sources of ignition. Ventilate area. Ventilate area with explosion-proof equipment. Spills may be collected with absorbent materials. Use non-sparking tools. Evacuate all unnecessary personnel. Place collected material in proper container. Complete personal protective equipment must be used during cleanup. Large spills - shut off leak if safe to do so. Dike and contain spill. Pump to storage or salvage vessels. Use absorbent to pick up excess residue. Keep salvageable material and rinse water out of sewers and water courses. Small spills - use absorbent to pick up residue and dispose of properly.

HANDLING AND STORAGE (ANSI Section 7)

Handling and storage : Store below 80f. Store below 100f (38c). Keep away from heat, sparks and open flame. Keep away from direct sunlight, heat and all sources of ignition.

Other precautions : Use only with adequate ventilation. Do not take internally. Keep out of reach of children. Avoid contact with skin and eyes, and breathing of vapors. Wash hands thoroughly after handling, especially before eating or smoking. Keep containers tightly closed and upright when not in use. Empty containers may contain hazardous residues. Ground equipment when transferring to prevent accumulation of static charge.

EXPOSURE CONTROLS/PERSONAL PROTECTION (ANSI Section 8)

Respiratory protection : Control environmental concentrations below applicable exposure standards when using this material. When respiratory protection is determined to be necessary, use a NIOSH/MSHA (Canadian z94.4) Approved elastomeric sealing- surface facepiece respirator outfitted with organic vapor cartridges and paint spray (dust/mist) prefilters. Determine the proper level of protection by conducting appropriate air monitoring. Consult 29CFR1910.134 For selection of respirators (Canadian z94.4).

Ventilation : Provide dilution ventilation or local exhaust to prevent build-up of vapors. Use explosion-proof equipment. Use non-sparking equipment.

Personal protective equipment : Eye wash, safety shower, safety glasses or goggles. Impervious gloves, impervious clothing, face shield, apron.

STABILITY AND REACTIVITY (ANSI Section 10)

Under normal conditions : Stable see section 5 fire fighting measures

Materials to avoid : Oxidizers, acids, reducing agents, bases, aldehydes, ketones, halogens, amines, carbon tetrachloride (at elevated temperatures), aluminum, nitric acid, metal compounds, lewis acids, mineral acids.

Conditions to avoid : Elevated temperatures, moisture, contact with oxidizing agent, storage near acids, sparks, open flame, ignition sources.

Hazardous polymerization : Will not occur may polymerize in presence of aliphatic amines.

TOXICOLOGICAL INFORMATION (ANSI Section 11)

Supplemental health information : Contains a chemical that is moderately toxic by ingestion. Contains a chemical that may be absorbed through skin. Excessive inhalation of fumes may lead to metal fume fever characterized by a metallic taste in mouth, excessive thirst, coughing, weakness, fatigue, muscular pain, nausea, chills and fever. Notice - reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Other effects of overexposure may include toxicity to liver, kidney, central nervous system, blood.

The information contained herein is based on data available at the time of preparation of this data sheet which ICI Paints believes to be reliable. However, no warranty is expressed or implied regarding the accuracy of this data. ICI Paints shall not be responsible for the use of this information, or of any product, method or apparatus mentioned and you must make your own determination of its suitability and completeness for your own use, for the protection of the environment, and the health and safety of your employees and the users of this material.
Complies with OSHA hazard communication standard 29CFR1910.1200.

ICI Paints North America 925 Euclid Avenue Cleveland, Ohio 44115 EMERGENCY TELEPHONE NO. (800) 545-2643

Carcinogenicity : The international agency for research on cancer (IARC) has evaluated ethylbenzene and classified it as a possible human carcinogen (group 2b) based on sufficient evidence for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans. In a 2 year inhalation study conducted by the national toxicology program (NTP), ethylbenzene vapor at 750 ppm produced kidney and testicular tumors in rats and lung and liver tumors in mice. Genetic toxicity studies showed no genotoxic effects. The relevance of these results to humans is not known.

Reproductive effects : High exposures to xylene in some animal studies, often at maternally toxic levels, have affected embryo/fetal development. The significance of this finding to humans is not known.

Mutagenicity : Triethylenetetramine has demonstrated weak mutagenic activity in standard in vitro tests, and has caused embryo- fetal toxicity and fetal malformations when fed to rats. Triethylenetetramine did not exhibit carcinogenic potential in life-time mouse skin painting studies.

Teratogenicity : No teratogenic effects are anticipated

ECOLOGICAL INFORMATION (ANSI Section 12)

No ecological testing has been done by ICI paints on this product as a whole.

DISPOSAL CONSIDERATIONS (ANSI Section 13)

Waste disposal : Dispose in accordance with all applicable regulations. Avoid discharge to natural waters.

REGULATORY INFORMATION (ANSI Section 15)

As of the date of this MSDS, all of the components in this product are listed (or are otherwise exempt from listing) on the TSCA inventory. This product has been classified in accordance with the hazard criteria of the CPR (controlled products regulations) and the MSDS contains all the information required by the CPR.

Physical Data (ANSI Sections 1, 9, and 14)

Product Code	Description	Wt. / Gal.	VOC gr. / ltr.	% Volatile by Volume	Flash Point	Boiling Range	HMIS	DOT, proper shipping name
313B0250	do not use, use dc313b0250d instead	24.77	334.95	41.44	90 f	244-304	*231	paint, 3, UN1263, PGIII
313C0910	catha coat 313 organic zinc-rich epoxy primer clear converter	7.54	338.66	41.11	110 f	243-304	*320	paint, combustible liquid, UN 1263, PGIII

Ingredients Product Codes with % by Weight (ANSI Section 2)

Chemical Name	Common Name	CAS. No.	313B0250	313C0910
benzene, ethyl-	ethylbenzene	100-41-4	.1-1.0	
2-heptanone	methyl amyl ketone	110-43-0	5-10	20-30
1,2,-ethanediamine, n,n'-bis(2-aminoethyl)-	triethylenetetramine	112-24-3		1-5
zinc oxide	zinc oxide	1314-13-2	1-5	
benzene, dimethyl-	xylene	1330-20-7	1-5	
oxirane,2,2'-(((1-methylethylidene) bis (4,1-phenyleneoxymethylene))) bis-	diglycidyl ether of bisphenol a	1675-54-3	1-5	
phenol, 4,4'-(1-methylethylidene)bis-, polymer with 2,2'-((1-methylethylidene)bis (4,1-phenyleneoxymethylene))bis(oxirane)	epoxy resin	25036-25-3	1-5	
fatty acids, c18-unsatd., dimers, reaction products with polyethylenepolyamines	polyamide resin	68410-23-1		40-50
1-butanol	n-butanol	71-36-3		10-20
zinc	zinc	7440-66-6	70-80	
sulfuric acid, barium salt	barium sulfate	7727-43-7	1-5	
amine adduct	amine adduct	Sup. Conf.		10-20

Chemical Hazard Data (ANSI Sections 2, 8, 11, and 15)

		ACGIH-TLV				OSHA-PEL				S.R.	S2	S3	CC					
Common Name	CAS. No.	8-Hour TWA	STEL	C	S	8-Hour TWA	STEL	C	S	Std.				H	M	N	I	O
ethylbenzene	100-41-4	100 ppm	125 ppm	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	y	n	n	y	n
methyl amyl ketone	110-43-0	50 ppm	not est.	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
triethylenetetramine	112-24-3	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
zinc oxide	1314-13-2	2 mg/m3	10 mg/m3	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	y	n	n	n	n	n	n
xylene	1330-20-7	100 ppm	150 ppm	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	y	n	n	n	n
diglycidyl ether of bisphenol a	1675-54-3	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
epoxy resin	25036-25-3	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
polyamide resin	68410-23-1	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
n-butanol	71-36-3	20 ppm	not est.	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	n	n	n	n	n
zinc	7440-66-6	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	y	y	n	n	n	n	n
barium sulfate	7727-43-7	10 mg/m3	not est.	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
amine adduct	Sup. Conf.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n

Footnotes:

C=Ceiling - Concentration that should not be exceeded, even instantaneously.

S=Skin - Additional exposure, over and above airborn exposure, may result from skin absorption.

n/a=not applicable
not est=not established
CC=CERCLA Chemical

ppm=parts per million
mg/m3=milligrams per cubic meter
Sup Conf=Supplier Confidential

S2=Sara Section 302 EHS
S3=Sara Section 313 Chemical
S.R.Std.=Supplier Recommended Standard

H=Hazardous Air Pollutant, M=Marine Pollutant
P=Pollutant, S=Severe Pollutant
Carcinogenicity Listed By:
N=NTP, I=IARC, O=OSHA, y=yes, n=no

SEÇÃO 3 - INSTALAÇÃO

GERAL

Esta seção descreve o procedimento de instalação recomendado para o equipamento Derrick definido pelo número do modelo e o número do desenho associado ao seu equipamento. A centrífuga é enviada completamente montado. Portanto, para segurança durante o transporte, o conjunto rotativo é sustentado pelos suportes de transporte. Este deve ser abaixado até a base e, em seguida os seus rolamentos pillow blocks presos à base.

SEGURANÇA

Ler e compreender **TODAS** as informações de segurança apresentadas neste manual **antes** de instalar e operar este equipamento. Consulte a Seção 2 para um resumo dos Avisos direcionados à instalação, operação e manutenção deste equipamento.

Antes de iniciar a instalação, revise os procedimentos de manipulação do equipamento nesta seção. Falha em observar a forma adequada de manejo do equipamento pode resultar em serias lesões ou morte de funcionários e/ou danos ao equipamento.

	ATENÇÃO! PARA ASSEGURAR O EQUILÍBRIO E ORIENTAÇÃO ADEQUADOS E PREVENIR DANOS AOS COMPONENTES QUANDO A UNIDADE FOR LEVANTADA, SÓ FIXAR AS CORRENTES DE LEVANTAMENTO NOS PONTOS DE ELEVAÇÃO DESIGNADOS. NÃO TENTAR A SUSPENÇÃO POR FIXAÇÃO EM NENHUM OUTRO LOCAL.
	ATENÇÃO! ASSEGURE-SE QUE O DISPOSITIVO DE SUPORTE TENHA CAPACIDADE DE LEVANTAMENTO SUFICIENTE PARA COM SEGURANÇA AGUENTAR O PESO DO EQUIPAMENTO. ABAIXE A CENTRÍFUGA SUAVEMENTE ATÉ SEU LUGAR, VISTO QUE CHOQUES PODEM CAUSAR DANOS.
	ATENÇÃO! NÃO RETIRAR OS SUPORTES DE TRANPORTE ATÉ QUE A CENTRÍFUGA ESTEJA POSICIONADA NO LOCAL FINAL DA INSTALAÇÃO.

ARMAZENAMENTO

Se a centrífuga não for instalada imediatamente, o gabinete de controle, o conjunto rotativo e os motores devem ser preservados conforme descrito nos parágrafos seguintes.

Gabinete de Controle

Para proteção contra o clima e a poeira, o gabinete deve ser coberto com uma lona (tarp) e armazenado em ambiente fechado, sob as seguintes condições ambientais:

Temperatura - 50°F a 86°F (10°C a 30°C)

Umidade Relativa - 20% a 50%

Gabinete de Controle (Cont.)

Se o gabinete vai continuar armazenado por um período prolongado antes da inicialização, faça o seguinte:

1. Ligue o gabinete a cada 6 meses e o mantenha ligado por 1 a 2 horas.
2. Para manter a baixa umidade dentro do gabinete, coloque um dessecante substituível ou uma pequena fonte de calor (como uma lâmpada incandescente) no interior do gabinete.

Conjunto Rotativo e Motores

Para a proteção contra o tempo e a poeira, a centrífuga deve ser coberta com uma lona e armazenada dentro do alojamento, nas seguintes condições ambientais:

Temperatura - 50°F a 86°F (10°C a 30°C)

Umidade Relativa - 20% a 50%

1. Abaixe o conjunto rotativo na base, como descrito posteriormente nesta seção.
2. Deixar as correias em V do acionador principal relaxadas.
3. A cada 3 meses, gire manualmente o conjunto do recipiente pelo menos 20 vezes, enquanto restringe a rotação do motor do transportador, então re-engraxe os rolamentos principais e do transportador.
4. Gire manualmente os eixos do motor do recipiente e do transportador de 5 a 10 revoluções a cada 3 meses de armazenamento. Se armazenado por mais de um ano, re-engraxe os rolamentos do motor antes da primeira inicialização.
5. Se os motores forem equipados com aquecedores internos, energia deve ser conectada e os aquecedores energizados.

SEQUÊNCIA DE INSTALAÇÃO

A seguir a seqüência de passos para a instalação da centrífuga. A sequência de apresentadas pode variar, dependendo das instalações do utilizador e da experiência anterior com esse tipo de equipamento.

1. Ler e compreender TODAS as informações de segurança na seção 2 antes de instalar e operar este equipamento.
2. Ler e compreender os processos de manipulação do equipamento desta seção antes de suspender e posicionar o equipamento.
3. Posicione e nivele o equipamento no local da instalação.
4. Remover os componentes de transporte, e baixar e fixar o rolamento pillow block do conjunto rotativo na base.
5. Ajustar a correia motriz (consulte a Seção 5).
6. Ligue a linha de descarga de líquido.
7. Se o duto de descarga deve ser utilizado, conecte-o à calha de descarga de sólidos.
8. Instale o componente de alimentação, e ligue as linhas de alimentação flexíveis para entrada de material de alimentação e dos flanges de líquido de descarga.
9. Selecione e instale a bomba de alimentação.

10. Conecte a fonte no equipamento e conecte o motor do recipiente, o motor do transportador e o motor da bomba de alimentação aos blocos terminais dentro do gabinete de controle.
11. Conecte o cabo do sensor à caixa de conexões de sensores e plugue.
12. Para gabinetes à prova de explosão, conecte uma fonte de ar comprimido para limpar a unidade.
13. Consulte a Seção 4 para procedimentos de inicialização e funcionamento.

REQUISITOS DE PREPARAÇÃO DO LOCAL E DE ESPAÇO LIVRE

Espaço suficiente deve ser fornecido ao redor do equipamento para facilitar o acesso para manutenção, inspeção e ajustes.

Operação típica e funções de manutenção incluem as seguintes atividades:

1. Acesse e opere o painel de controle de sistema.
2. Abrir e fechar a porta do gabinete de controle (Figura 3-1).
3. Abrir e fechar a tampa superior.
4. Engraxe os rolamentos do conjunto rotativo
5. Verifique e abasteça a caixa de engrenagens.
6. Conectar e desconectar as linhas de alimentação e de descarga de liquido.
7. Remova e instale o tubo de alimentação (ver Figura 3-2).

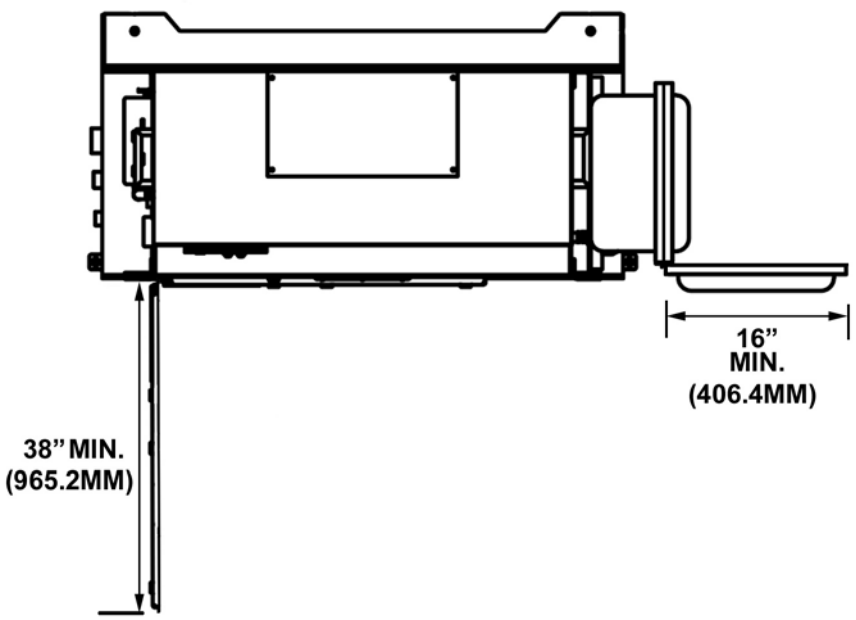


Figura 3-1 Afastamentos Necessários para Abertura da Porta do Gabinete e do Quadro Elétrico

POSICIONAMENTO E MONTAGEM DO EQUIPAMENTO

Placas de Base são necessárias durante a instalação da centrífuga. Organize o local da instalação e localize as placas de base de acordo com a Figura 3-2. As placas de base possuem postes centrais de 1-9/16 "x 1-9/16" (40 mm x 40 mm). Eles podem ser aparafusados ou soldados à plataforma de montagem para posicionar corretamente e evitar movimento da centrífuga. Ao baixar a centrífuga para a placa de base, certifique-se que os postes de centralização se acoplam à abertura na parte inferior de cada um dos isoladores de vibração.

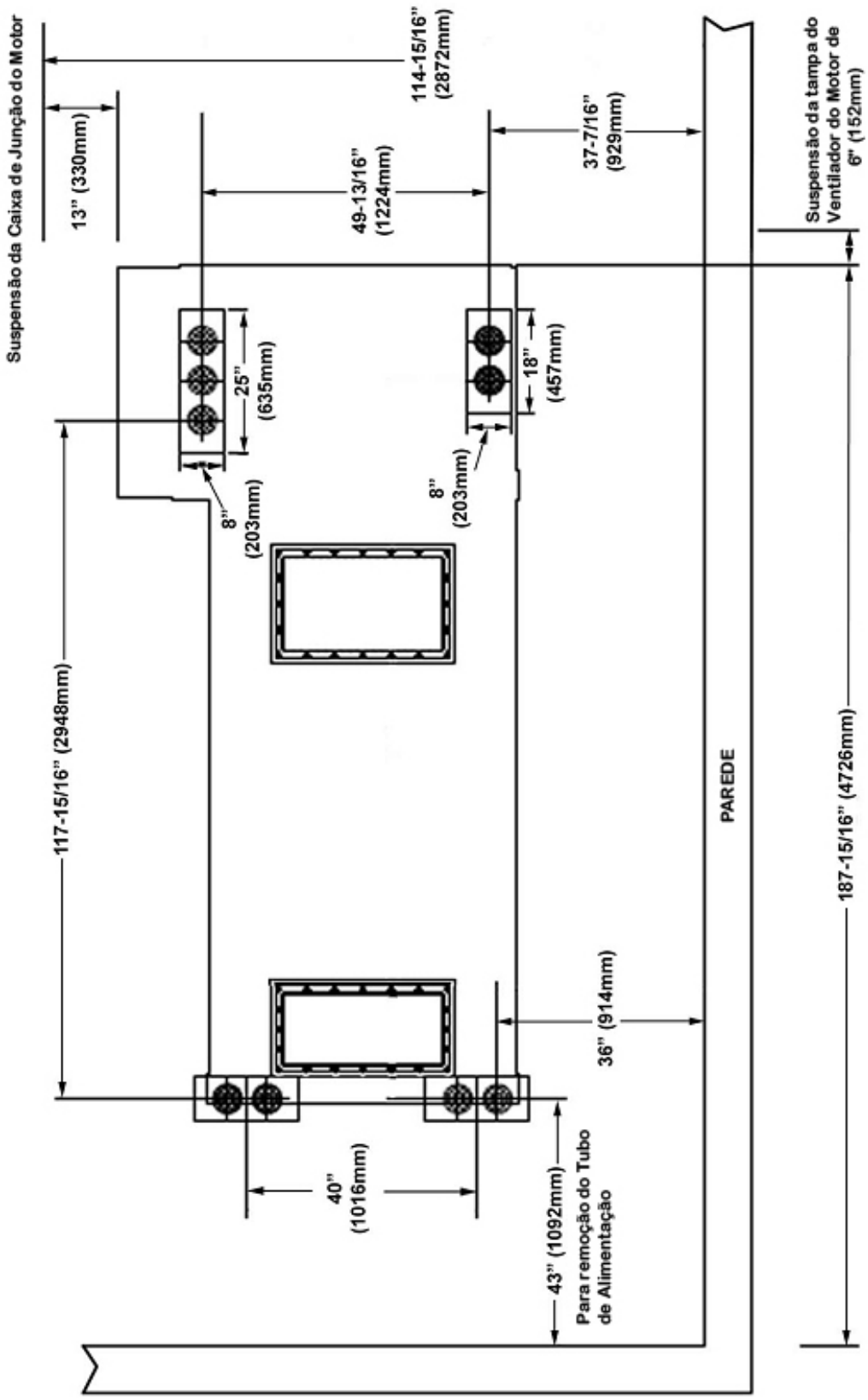


Figura 3-2 Organização do Local de Instalação da Centrífuga

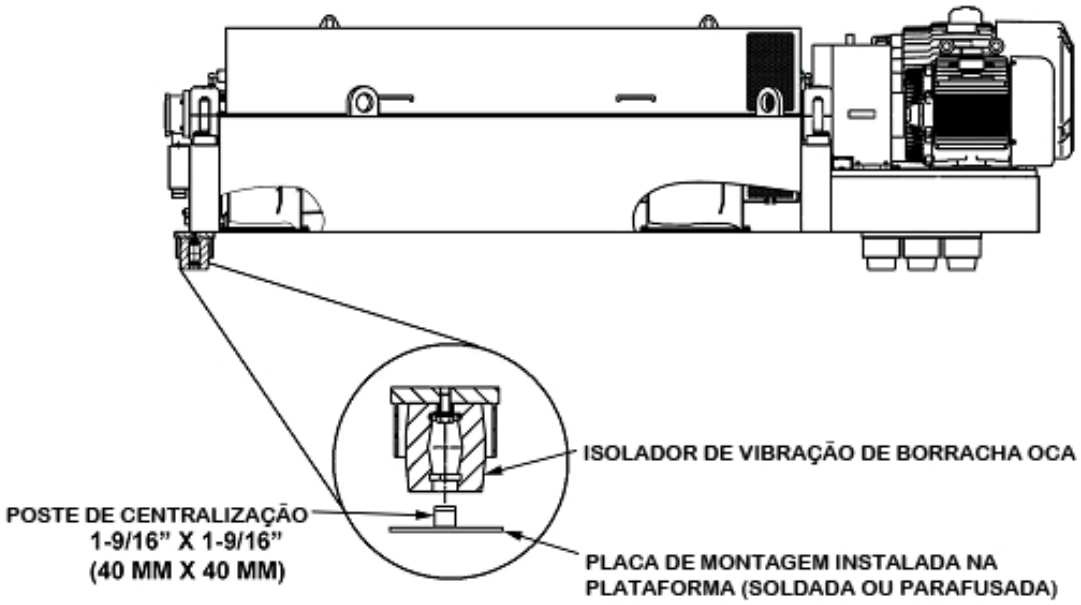

ISOLADOR DE VIBRAÇÃO DE BORRACHA OCA
POSTE DE CENTRALIZAÇÃO
1-9/16" X 1-9/16"
(40 MM X 40 MM)
PLACA DE MONTAGEM INSTALADA NA
PLATAFORMA (SOLDADA OU PARAFUSADA)

Figura 3-3 Montagem da Centrífuga

CALHAS DE DESCARGA DE LÍQUIDOS E DE SÓLIDOS

Observe as seguintes considerações do projeto quando montar as calhas de descarga de líquidos e sólidos. Para determinar as dimensões e as disposições dos buracos de montagem, consulte o desenho de disposições gerais na Seção 8.

Tubo de descarga de Líquido

Quando montar a calha, certifique-se de mantê-la o mais reta possível. Curvas mínimas são aceitáveis, mas lembre-se que qualquer curva vai restringir o fluxo de saída da centrífuga.

Tubo de descarga de sólido

A calha da extremidade de sólidos deve ser projetada em um ângulo suficientemente íngreme para facilitar a autolimpeza. Se isso não for possível, um meio deve ser incluído para remover sólidos acumulados na calha periodicamente.

NIVELAMENTO DO EQUIPAMENTO

A centrífuga deve estar bem nivelada para um funcionamento satisfatório. O equipamento deve ser nivelado ao longo do comprimento e largura da unidade (Figura 3-3). Um Nivelador 2-foot ou torpedo nível é recomendado. Calços não compressíveis devem ser usados, caso seja necessário, para o nivelamento da máquina.

NIVELAMENTO DO EQUIPAMENTO (CONT.)

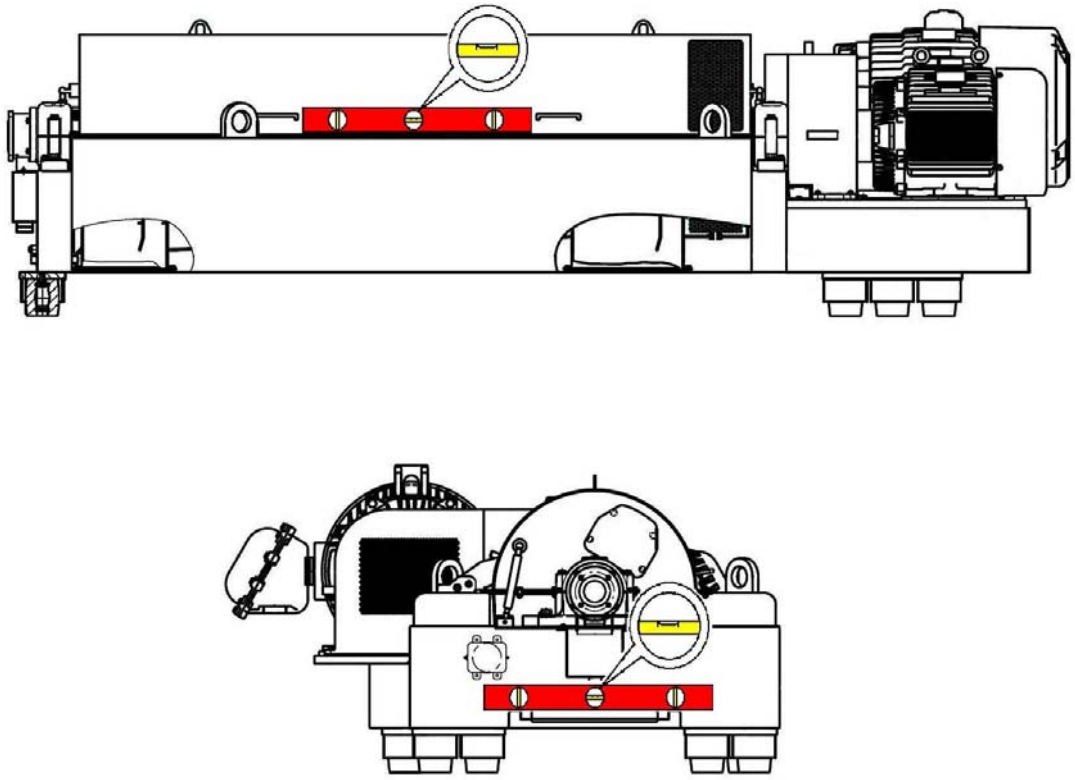


Figura 3-3 Nivelamento da Centrífuga

DESCIDA E FIXAÇÃO DO CONJUNTO ROTATIVO

Note! Não descarte as tiras de borracha entre os rolamentos pillow block, tampa e base após a remoção. Estas tiras devem ser reinstaladas sempre que a máquina for movida, para evitar danos aos rolamentos do conjunto rotativo e da base durante o trânsito.

Após o posicionamento final e nivelamento da centrífuga, tiras de borracha macia inserida entre os rolamentos pillow block e a base, bem como tiras de borracha rígida entre a tampa do invólucro e a base devem ser removidas. As tiras evitam danos aos rolamentos do conjunto rotativo durante o trânsito.

Para remover as tiras de borracha, siga o procedimento:

1. Remova todos os parafusos fixando a tampa superior ao longo de ambos os lados, mas não remova os parafusos em ambas às extremidades da tampa.
2. Remova os parafusos fixando os rolamentos pillow block à base e parafusos fixando a metade superior dos pillow blocks às metades inferiores (Figura 3-4).
3. Instale dois parafusos Jack (Figura 3-5) na metade superior de cada pillow block, e parafusos de rosca por todas as metades inferiores.

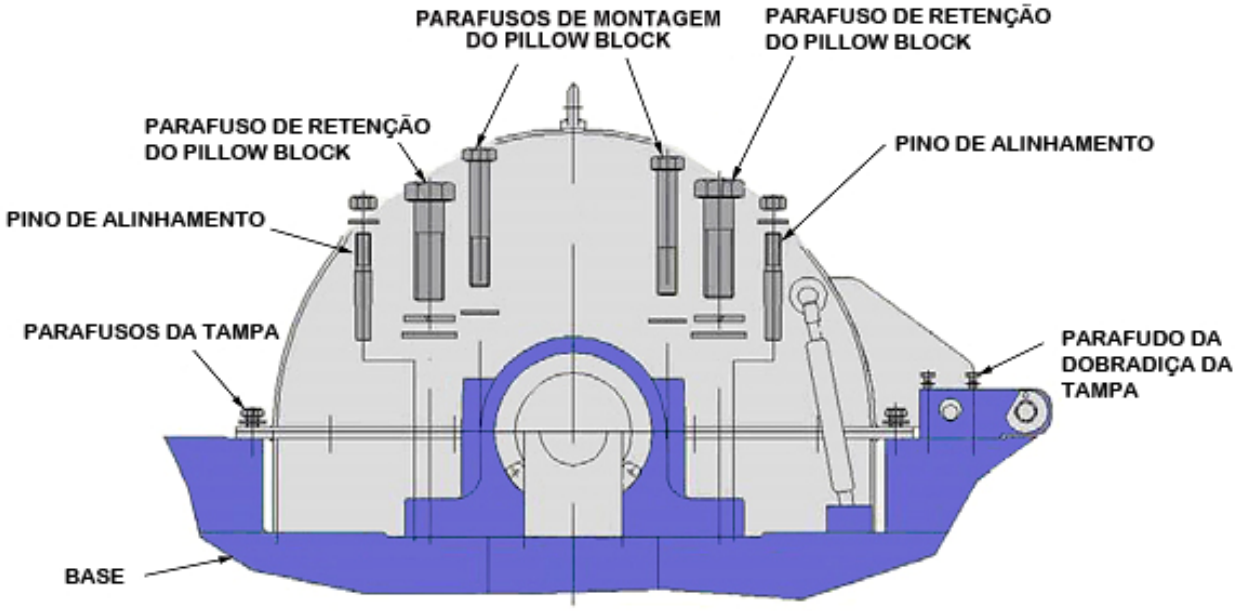

PARAFUSOS DE MONTAGEM DO PILLOW BLOCK
PARAFUSO DE RETENÇÃO DO PILLOW BLOCK
PARAFUSO DE RETENÇÃO DO PILLOW BLOCK
PINO DE ALINHAMENTO
PINO DE ALINHAMENTO
PARAFUSOS DA TAMPA
PARAFUDO DA DOBRADIÇA DA TAMPA
BASE

Figura 3-4 Fixador do Pillow Block e da Tampa do Invólucro

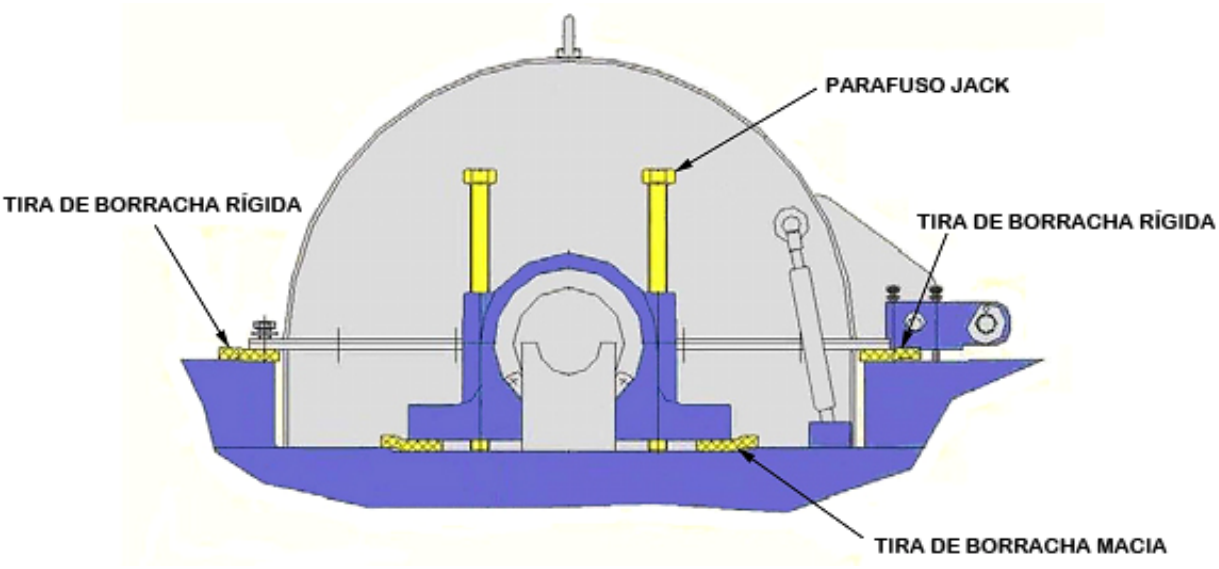


Figura 3-5 Localização dos Componentes de Transporte

4. Gire os parafusos Jack no sentido horário para levantar os pillow blocks o suficiente para permitir a remoção de todas as tiras de borracha macias e rígidas e remova as tiras.
5. Limpe as superfícies de montagem da metade inferior do pillow block e da base e em seguida aplique uma fina camada de graxa ou inibidor de corrosão em ambas as superfícies.
6. Certifique-se que os buracos de pinos de alinhamento na base estão limpos e desobstruídos pela inserção de um mandril cônico através dos furos.
7. Insira quatro pinos de alinhamento nos orifícios correspondentes.

DESCIDA E FIXAÇÃO DO CONJUNTO ROTATIVO (CONT.)

8. Girar os parafusos Jack igualmente em sentido anti-horário para lentamente abaixar os pillow blocks na base, ao fazer isso use os pinos de alinhamento para posicionar corretamente os pillow blocks antes que entrem em contato com a base. Retire os parafusos Jack após os pillow blocks estiverem completamente em contato com a base e os buracos de montagem estiverem alinhados.
9. Insira dois parafusos retentores de pillow block (Figura 3-4), através da metade superior de cada pillow block e aperte os parafusos uniformemente, de acordo com a especificação de tor que aplicável na Seção 5.
10. Utilize um martelo de bronze para assentar os pinos de alinhamento totalmente nos rolamentos de pillow blocks e bases, em seguida, introduza os parafusos de montagem com anilhas e arruelas de pressão, através dos orifícios. Aperte os parafusos lentamente até atingir o torque especificado na Seção 5. Não aperte as porcas dos pinos de alinhamento.
11. Instale e aperte todos os parafusos ao longo dos dois lados da tampa do invólucro.
12. Ajuste a tensão das correias motrizes de acordo com a Manutenção Preventiva na Seção 5.

CONEXÕES DE ALIMENTAÇÃO E DESCARGA

Para evitar danos à centrífuga e ao sistema de tubulação, em caso de desequilíbrio da centrífuga, o isolamento de vibração é necessário. Conseqüentemente, ligações flexíveis devem ser utilizados para todas as conexões de alimentação e descarga. Uma fonte de água potável deve ser ligada ao encaixe de descarga no componente de alimentação para a limpeza da centrífuga antes do desligamento. Uma válvula de fechamento deve ser instalada na tubulação de descarga.

O componente de alimentação (Figura 3-6) fornecido com a centrífuga tem conexões fêmeas para aceitar os encaixes de tubulação de alimentação e descarga do cliente e uma ligação flexível integral para o isolamento de vibração. A calha de descarga de líquidos, que é fornecida pelo cliente, também exige um isolador de vibração. Se uma calha de descarga de sólidos é utilizada, deve ser ligada à calha de descarga de sólidos através de uma conexão flexível. Consulte o desenho de organização geral na seção 8 para as dimensões de flange de conexão de calhas de descarga de líquidos e sólidos e os padrões de parafuso.

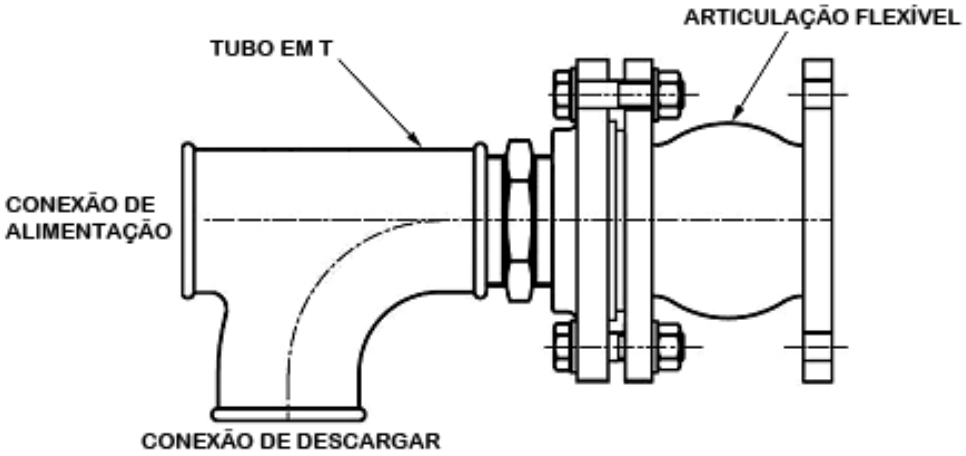


Figura 3-6 Componente de Alimentação

ABASTECIMENTO DE ÁGUA DOCE

Uma linha de água fresca com válvula de fechamento tipo esfera é necessária para facilitar a diluição da lama/pasta quando necessária e para executar a limpeza antes do desligamento.

AR COMPRIMIDO

Para os gabinetes de controle operados em um ambiente perigoso, uma fonte de ar filtrado, seco e comprimido a 120 PSI é necessária para o funcionamento do sistema de drenagem. Consulte a Seção 10 para o tamanho da linha de fornecimento e requerimentos de taxas de fluxo.

BOMBA DE ALIMENTAÇÃO

O cliente deve fornecer uma bomba de alimentação de deslocamento positivo para alimentar a centrífuga com lama. Uma bomba de cavidade progressiva com caixa de engrenagem de taxa fixa e motor acionador de bomba de impulso inverso máxima de 30HP é recomendada. O motor deve ser capaz de operar no intervalo de velocidade de 180 a 2700 RPM, de 6 a 90 Hz e também cumprir todos os requisitos das aplicações, incluindo tensão, frequência e área de classificação. O tamanho, motor e taxa da caixa de engrenagem da bomba devem ser escolhidos para entregar o fluxo máximo desejado à velocidade do rotor da bomba (determinada pelo fabricante) sendo baixo o suficiente para evitar desgaste acelerado do rotor e/ou estator.

A bomba deve ser conectada ao sistema de controle da centrífuga, conforme descrito em *Conexões de Energia Elétrica* nesta seção, a fim de que sua operação possa ser supervisionada pela centrífuga.

CONEXÕES DE FORÇA ELÉTRICA

ATENÇÃO! TENSÃO PERIGOSA PRESENTE. SE A FORÇA DE ENTRADA FOR DIVIDIDA, CERTIFIQUE-SE DE QUE A SINCRONIZAÇÃO DE FASE VERTICAL ESTÁ CORRETA ANTES DE APLICAR FORÇA À CENTRÍFUGA.

Opções de Conexão

Conecte a fonte de energia trifásica das instalações ao gabinete de controle de acordo com a visão adequada na Figura 3-7. As conexões do gabinete de controle de áreas não perigosas são feitas dentro do gabinete de controle, enquanto conexões de áreas perigosas são feitas no painel elétrico preso ao lado direito do gabinete.

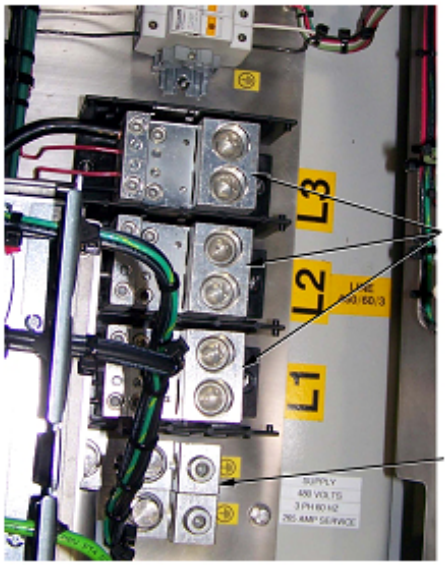
Note que a força pode ser conectada com um cabo único de bitola pesada ou dividida entre dois cabos menores, mais leves. Os cabos de bitola menor usado para as conexões de entrada dividida geralmente são mais fáceis de manusear. Os componentes de cabos de entrada necessários para as duas opções são os seguintes:

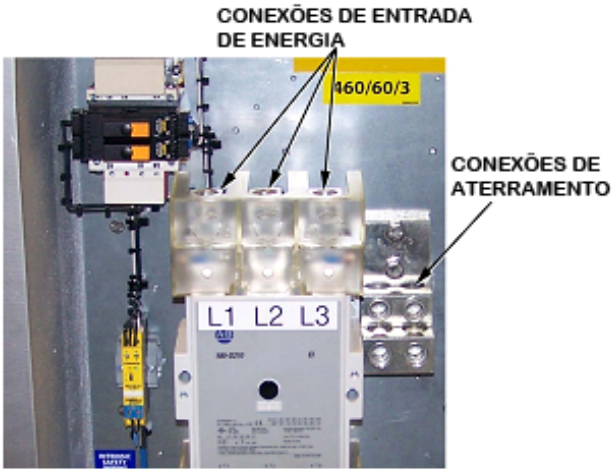
Opção 1 - Um cabo AWG 4/0 por fase e uma Preme-graxeta NPT de 3"

Opção 2 - Dois cabos AWG 2 por fase e duas Preme-graxeta NPT de 2"

Se a entrada é dividida (Figura 3-8), tal como descrito na Opção 2, certifique-se de agrupar condutores da mesma fase / cor. Consulte o diagrama esquemático elétrico na Seção 8 para obter ajuda e informações adicionais sobre as conexões elétricas e taxas.

CONEXÕES DE FORÇA ELÉTRICA (CONT.)





Gabinete de Controle de Área não Perigosa **Gabinete de Controle de Área perigosa**

Figura 3-7 Conexões de Energia Elétrica

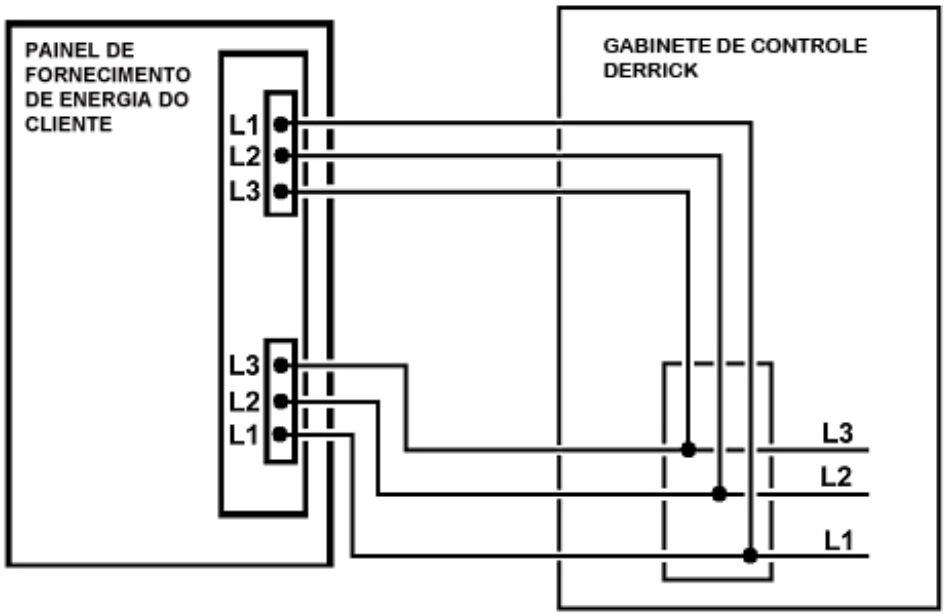


Figura 3-8 Conexões de Energia de Entrada Dividida

Uma fonte de alimentação primaria desconectada por fusível é necessário para este equipamento. A fonte de alimentação primaria desconectada por um fusível e os cabos de interligação com o equipamento devem ser de tamanho adequado e em conformidade com o Código Elétrico Nacional (NEC) e todas as normas estaduais e municipais aplicáveis.

Os requisitos adicionais de cabeamento são os seguintes:

1. O dispositivo de desconexão por fusível deve ter capacidade de interrupção suficiente para segurar a falta máxima de capacidade de corrente do sistema de abastecimento de energia.
2. As conexões do GND no gabinete de controle e na caixa de conexões do sistema de sensor devem ser conectadas a um aterramento conhecido.

CONEXÕES DO RECIPIENTE, DO TRANSPORTADOR E DA BOMBA DE ALIMENTAÇÃO.

O recipiente e os motores de acionamento do transportador exigem linha de força trifásica e conexões de aterramento. A energia é obtida por conexões com blocos terminais no interior da cabine de controle. Da mesma forma, o motor da bomba de alimentação do cliente deve ser conectado ao sistema de controle da centrífuga para o controle de seu funcionamento.

Conecte o recipiente, transportador e os motores da bomba de alimentação a blocos terminais na parte inferior do lado esquerdo da cabine de controle, como mostrado na Figura 3-9. O sistema de controle pode operar um motor de acionamento de bomba de alimentação de até 30HP.

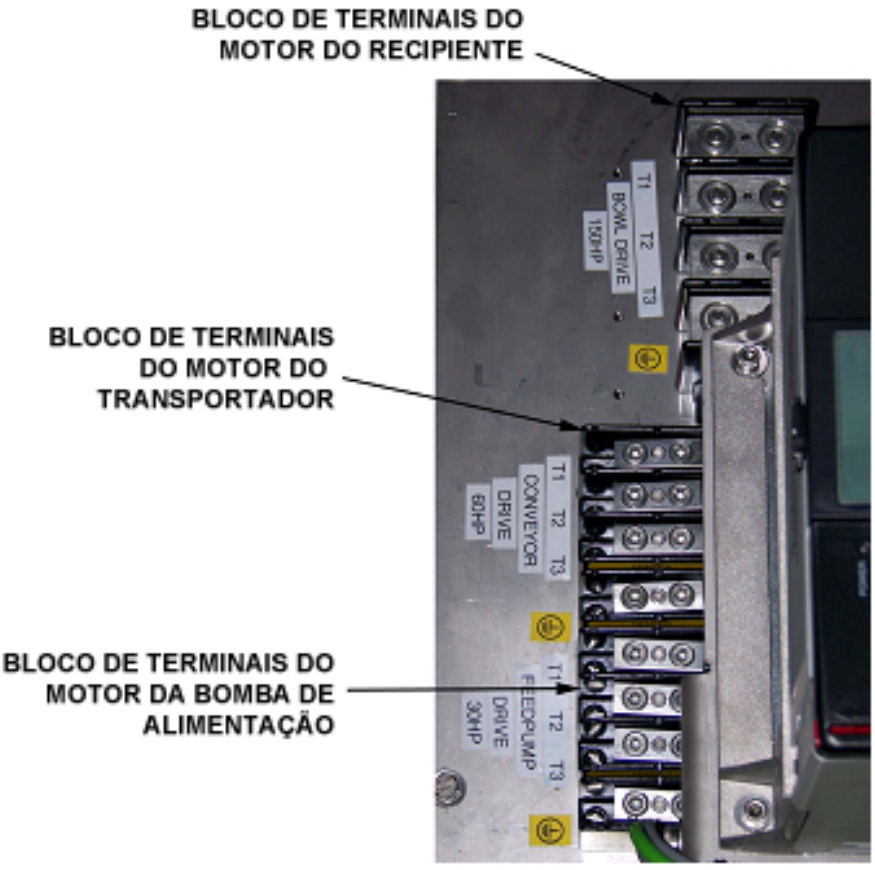


Figura 3-9 Conexões de Energia Elétrica ao Recipiente, Transportadores e Motores da Bomba.

TESTE DE POLARIDADE

ATENÇÃO! CERTIFIQUE-SE QUE OS MOTORES ROTACIONAM NA DIREÇÃO CORRETA. POLARIDADE INCORRETA DO MOTOR DO TRANSPORTADOR FARÁ COM QUE O MOTOR DO TRANSPORTADOR ROTACIONE A UMA VELOCIDADE INCORRETA, RESULTANDO EM PROBLEMAS DE PROCESSAMENTO.

No procedimento a seguir, a polaridade é vital. Certifique-se que todos os motores giram na direção correta. Apenas verificar se os sólidos são descarregados da extremidade de sólidos **NÃO** assegura a polaridade correta!

Se o motor do transportador estiver mal conectado, o transportador pode ficar obstruído ou inundado, dependendo das definições de velocidade do recipiente e do transportador. Teste a polaridade correta de todas as conexões da seguinte forma:

1. Ligue à centrífuga.
2. Acione o recipiente a 20 RPM com uma velocidade diferencial do transportador de 5 RPM.
3. Confirme o sentido de rotação para o recipiente, transportador, bomba de alimentação e motores do condensador de ar condicionado do seguinte modo:
   a. Recipiente - Em sentido anti-horário visto da extremidade do ventilador
   b. Transportador - Em sentido anti-horário visto da extremidade do ventilador
   c. Bomba de alimentação - Dados do fabricante
   d. Condensador do ar condicionado - Em sentido horário visto da extremidade do ventilador
4. Corrigir rotação inversa desligando a energia e mudando dois dos três terminais de energia no(s) bloco(s) terminal dentro do gabinete (veja a Figura 3-9 e diagrama elétrico esquemático na Seção 8).

ATENÇÃO! A CENTRÍFUGA DEVE SER OPERADA NA VOLTAGEM DE ABASTECIMENTO DESIGNADA.

ATENÇÃO! ALTA TENSÃO PODE ESTAR PRESENTE. TENHA CERTEZA QUE O FUSÍVEL QUE DISCONECTA O FORNECIMENTO DE ENERGIA ELÉTRICA DESTE EQUIPAMENTO ESTÁ ABERTO. BLOQUEI E ETIQUETE (LOTO) O SUPRIMENTO DE ENERGIA PARA PREVENIR APLICAÇÃO ACIDENTAL DE ENERGIA ENQUANTO CONEXÕES ELETRICAS SÃO FEITAS.

ATENÇÃO! CONEXÕES ELÉTRICAS DEVEM SER FEITAS DE ACORDO COM O CÓDIGO ELÉTRICO NACIONAL (NEC) E TODOS OS CÓDIGOS LOCAIS APLICÁVEIS. FALHA NO CUMPRIMENTO PODE RESULTAR NUMA CONDIÇÃO PERIGOSA QUE PODERIA MACHUCAR ALGUEM OU DANIFICA O EQUIPAMENTO. ASSEGURAR-SE QUE TODAS AS CONEXÕES ELÉTRICAS E DE CONDUITES ESTÃO SEGURAS.

CONEXÕES DO SENSOR

Um cabo fornecido pelo cliente é utilizado para ligações de sensores. Uma extremidade do cabo é ligada aos terminais na caixa de conexões de sensores, como mostrado na Figura 3-10, e o extremo oposto está ligado ao plugue fornecido com a centrífuga (Figura 3-11). Conecte os fios

aos terminais numerados correspondentes (de 1 a 16) no plugue. Depois de completar as ligações, ligue o cabo no receptáculo na parte superior esquerda do gabinete de controle.

CONEXÃO DE AR COMPRIMIDO DO SISTEMA DE DRENAGEM

Para Gabinetes de Controle à prova de explosões, forneça ar comprimido à pressão e vazão necessária para a unidade de controle de limpeza. Ligue o suprimento de ar comprimido de acordo com a documentação do MiniDreno da Expo Technologies, Seção 10.

INICIALIZAÇÃO DE MÁQUINA

Consulte a Seção 4 para a primeira inicialização e procedimentos de operação para a centrífuga.

ATENÇÃO! NÃO TENTE OPERAR A MÁQUINA COM COMPONENTES DE TRANSPORTE INSTALADOS.

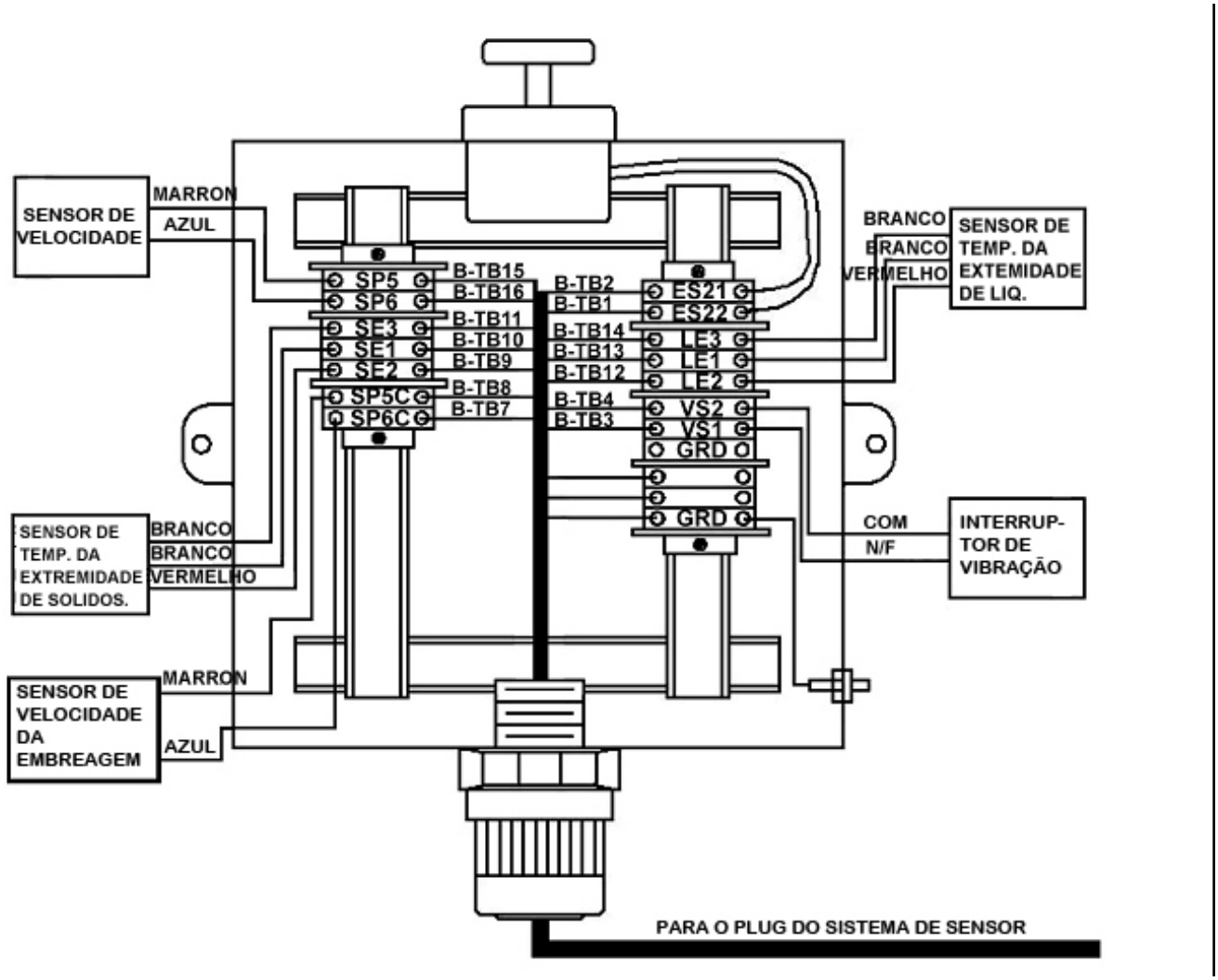


Figura 3-10 Conexões da Caixa de Conexões do Sistema de Sensores

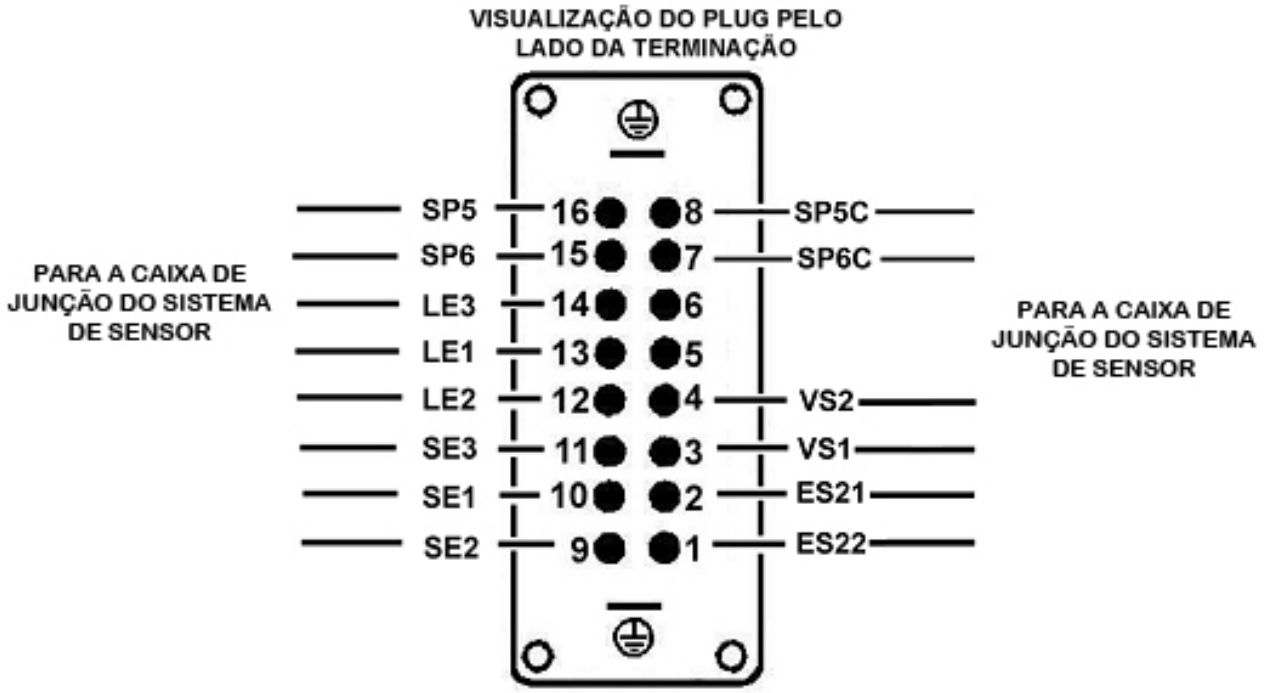


Figura 3-11 Conexões de Plugues do Sistema de Sensores

SEÇÃO 4 - INSTRUÇÕES OPERACIONAIS

GERAL

Os procedimentos desta seção são para uso apenas por pessoal treinado qualificado para operar equipamento de alta velocidade de rotação. Procedimentos de inicialização inicial e normal, operação, desligamento e desligamento de emergência estão incluídos. Após a inicialização e os procedimentos de operação, informações detalhadas são fornecidas nas telas de controle para auxiliar o operador e técnico na compreensão da operação da centrífuga e a utilizar plenamente sua capacidade.

A centrífuga é projetada para ser utilizada apenas para os fins previstos no momento da compra. A operação em qualquer outra aplicação requer a consulta da engenharia Derrick.

SEGURANÇA OPERACIONAL

	ATENÇÃO! TODO PESSOAL DE OPERAÇÃO E DE MANUTENÇÃO DEVE LER E ENTENDER TODAS AS INFORMAÇÕES DE SEGURANÇA DESTE MANUAL ANTES DE TRABALHAR COM O EQUIPAMENTO.
	ATENÇÃO! ASSEGURE-SE QUE TODAS AS TAMPAS ESTÃO FECHADAS E SEGURAS E TODOS OS FUNCIONÁRIOS FORAM REMOVIDO ANTES DA MÁQUINA COMEÇAR A FUNCIONAR.
	ATENÇÃO! ASSEGURE-SE QUE TODOS OS COMPONENTES DE TRANSPORTE FORAM RETIRADOS E OS ROLAMENTOS PILLOW BLOCKS ESTÃO DEVIDAMENTE APERTADOS.
	ATENÇÃO! SEMPRE PERMITA QUE A MÁQUINA DESACELERE ATÉ UMA PARADA COMPLETA ANTES DE ABRIR A TAMPA SUPERIOR OU REMOVER OS PROTETORES.
	ATENÇÃO! NÃO OPERAR A CENTRÍFUGA SE ELA DESENVOLVER BARULHO OU VIBRAÇÃO EXCESSIVA. SEMPRE CONFIRME QUE O INTERRUPTOR DE VIBRAÇÃO E OUTROS DISPOSITIVOS DE SEGURANÇA ESTÃO FUNCIONANDO.

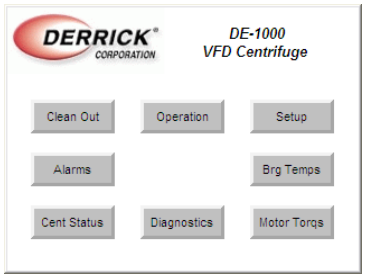
SISTEMA DE DRENAGEM (APENAS AMBIENTES PERIGOSOS)

Só centrífugas que funcionarão em ambientes perigosos são equipadas com sistema de drenagem. Durante a inicialização, o sistema de drenagem dirige para fora todos os gases do interior do gabinete e, em seguida, mantem a pressão positiva dentro do gabinete de controle para evitar a entrada de potenciais gases explosivos. O funcionamento do sistema de drenagem é iniciado quando a pressão de ar suficiente é sentida dentro do gabinete. Um ciclo de drenagem rápida de 14 minutos a 16 CFM ocorre, enquanto o sistema de drenagem evita que a energia seja aplicada ao interior do gabinete. No final do ciclo de drenagem rápida, o sistema de drenagem fecha o contator principal que permite à energia fluir para o interior do gabinete. A drenagem de 2 CFM contínua começa e continua durante e após a operação de centrifugação. É preferível manter o gabinete pressurizado. Se em algum momento uma perda de pressão do gabinete for detectada, o contator principal será aberto imediatamente, desligando a energia. A drenagem rápida de 14 minutos é repetida antes da energia ser re-estabelecida.

PRIMEIRA INICIALIZAÇÃO

Execute o procedimento de inicialização inicial quando a centrífuga estiver sendo iniciado pela primeira vez após a instalação ou depois que a máquina tenha sido transferida.

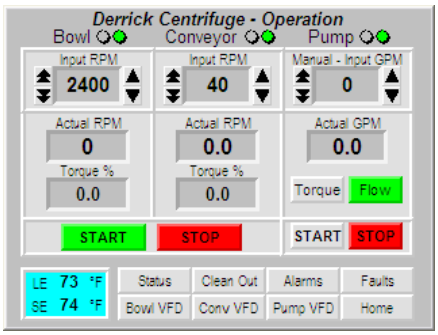
1. Todas as ferramentas, documentos e componentes de transporte foram removidos e não existem obstáculos para a operação.
2. Verifique se todos os funcionários estão longe do equipamento.
3. Confirme que todos os funcionários de operação e manutenção leram e compreenderam todas as informações sobre o funcionamento e segurança na Seção 2.
4. Verifique se o equipamento foi instalado corretamente, todos os suportes de transporte foram removidos e os rolamentos pillow block foram apertados com o torque especificado na Seção 3.
5. Para o gabinete a prova de explosões, ligue o ar comprimido para o sistema de drenagem.
6. Ligue e centrífuga. A seguinte tela aparecerá (no armário à prova de explosão, será exibida após o ciclo de drenagem ser concluído):



7. Sem a centrifugação estar em andamento, execute as seguintes verificações de segurança para confirmar se as conexões entre o gabinete de controle e centrífuga estão corretas:
   - Opere os botões de parada de emergência na caixa de junção e no gabinete de controle, e procure pela mensagem de alarme de Parada de emergência no painel de comando.
   - Solte os botões de paragem de emergência para limpar a mensagem de alarme.
   - Bata na carcaça do Interruptor de vibração horizontalmente com um martelo de borracha ou de couro cru, e verificar se há mensagem de falha para alta vibração no painel de controle.

- Pressione o botão de restaurar no interruptor de vibração para limpar a mensagem de alarme.

8. Selecione *Cent. Status* para verificar se a máquina está pronta para a operação. Corrigir quaisquer deficiências antes de prosseguir com o processo de inicialização. Se a condição for satisfatória, clicar no canto superior direito para retornar à *tela* inicial.
9. Selecione *Configuração* e clique em Configurações da Bomba para visualizar as informações operacionais da bomba. Revisar quaisquer informações operacionais, se necessário, e clique no canto superior direito para retornar à tela de configuração. Selecione *Home* para retornar à tela inicial.
10. Selecione *Operação* para visualizar a seguinte tela:



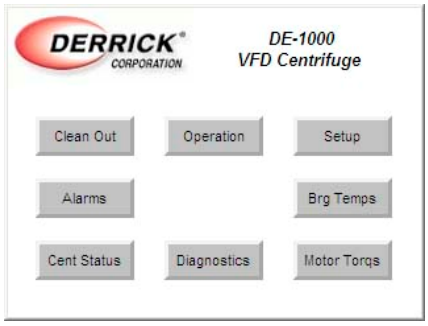
11. Usando as teclas de seta para cima e para baixo, defina o RPM do recipiente em 20 RPM, e o RPM de entrada do conjunto transportador em 5 RPM. Confirme o sentido de rotação para o recipiente, transportador, bomba de alimentação e motores do condensador de ar condicionado do seguinte modo:
    - Recipiente - em sentido anti-horário visto da extremidade do ventilador
    - Transportador - em sentido anti-horário visto da extremidade do ventilador
    - Bomba de alimentação - Dados do fabricante
    - Condensador do ar condicionado - em sentido horário visto da extremidade do ventilador
12. Corrigir rotação inversa desligando a energia e mudando dois dos três terminais de energia no(s) bloco(s) terminal dentro do gabinete (veja a Seção 3 e diagrama elétrico esquemático na Seção 8).
13. Iniciar centrífuga de acordo com procedimento de Inicialização Normal abaixo, começando pelo 4º passo.

INICIALIZAÇÃO NORMAL

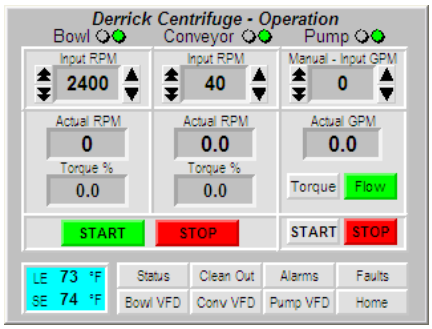
1. Com a energia elétrica desligada abra manualmente a tampa do conjunto do recipiente rotativo para verificar se o recipiente giro livremente e sem atrito perceptível.
2. Feche a tampa, aperte todos os parafusos da tampa a torque exigido (ver seção 5), e assegure-se que todos os protetores estão no local.
3. Verifique se todos os funcionários estão longe da centrífuga e todas as proteções estão nos seus locais antes de fornecer energia elétrica para o equipamento.
4. Apenas para o gabinete a prova de explosões, ligue o ar comprimido para começar o ciclo de drenagem do gabinete.

INICIALIZAÇÃO NORMAL (CONT.)

5. Ligue e centrífuga. A seguinte tela aparecerá (no armário à prova de explosão, será exibida após o ciclo de drenagem ser concluído):



6. Com a Tela Inicial sendo exibida, selecione Operação para visualizar a seguinte tela:



7. Usando seta para cima e para baixo, defina os RPMs de entrada do recipiente e do conjunto transportador na velocidade desejada.

Note! A velocidade do recipiente deve ser definida no mínimo em 750 RPM.

8. Duas opções estão disponíveis para o controle da bomba de alimentação. Se o controle automático for desejado pelo PLC, selecione Torque. O GPM da bomba será automaticamente alternado se baseado no percentual de torque do recipiente e do transportador. Selecione Fluxo para o operador determinar o GPM da bomba. Note que, mesmo com o fluxo selecionado o PLC vai variar o GPM da bomba ou até mesmo desligar a bomba se torque excessivo for detectado.
9. Selecione INICIAR para ativar a centrífuga. Note que a velocidade do recipiente e do transportador vai aumentar gradualmente até atingir suas configurações, e a % de Torque para o recipiente e o transportador aumentará.
10. Quando a velocidade do recipiente atingir a velocidade determinada, selecione INICIAR Bomba para inicializar a bomba de alimentação, e lentamente introduzir alimentação à centrifugar.

Note! A bomba não inicializará até que a velocidade real do recipiente seja determinada em aproximadamente 120 RPM.

11. Ajuste a taxa de alimentação, a velocidade do recipiente e/ou a velocidade do transportador como necessário para melhorar a operação da centrífuga. Selecione a tela de *Dados* em qualquer momento para revisar e monitorar as características operacionais da centrífuga, incluindo o status do ar-condicionado, tempo de funcionamento decorrido, e os dados do VFD.

Note! Dependendo da configuração de velocidade diferencial do transportador, em uma velocidade do recipiente acima de 300 RPM o motor do transportador pode girar na direção oposta.

OPERAÇÃO

Propriedades da lama/pasta de entrada e separação desejada devem ser conhecidas antecipadamente. Esta informação pode ser usada para definir e alterar a velocidade do recipiente, a velocidade diferencial do transportador e a taxa de alimentação (menos quando definido para controle automático), como necessário, durante o funcionamento da centrífuga. Monitoração contínua das indicações do painel de controle da centrífuga, bem como a condição da lama/pasta de entrada, é essencial para alcançar a clareza dos efluentes e aridez dos sólidos desejados. Aumento no Torque do transportador indica que um ou mais parâmetros de funcionamento devem ser diminuídos para reduzir o torque. Por outro lado, Queda no torque do transportador indica que a velocidade e/ou taxa de alimentação podem ser aumentadas. Os parâmetros operacionais devem ser ajustados, se necessário, para melhorar a operação da centrífuga e prevenir desligamentos automáticos devido a excessivo torque do transportador ou recipiente.

A tela *de operação* (Figura 4-1) permite ao operador visualizar informações do funcionamento atuais do recipiente, transportador, e da bomba, e ajustar os parâmetros conforme necessário para atender às condições de mudança. Através desta tela, o operador pode visualizar e definir as percentagens de RPMs e torque do recipiente e do transportador, definir a taxa de fluxo da bomba de alimentação, e visualizar as temperaturas dos rolamentos. Ajustes na velocidade do transportador e do recipiente podem ser realizados utilizando as setas para cima e para baixo ou digitando os números reais sobre o teclado numérico. Além disso, opções para parar a centrífuga são fornecidas, exibindo as telas de operação do VFD e selecionando as telas de Status, Limpar, Falhas, Alarmes, e Pagina Inicial.

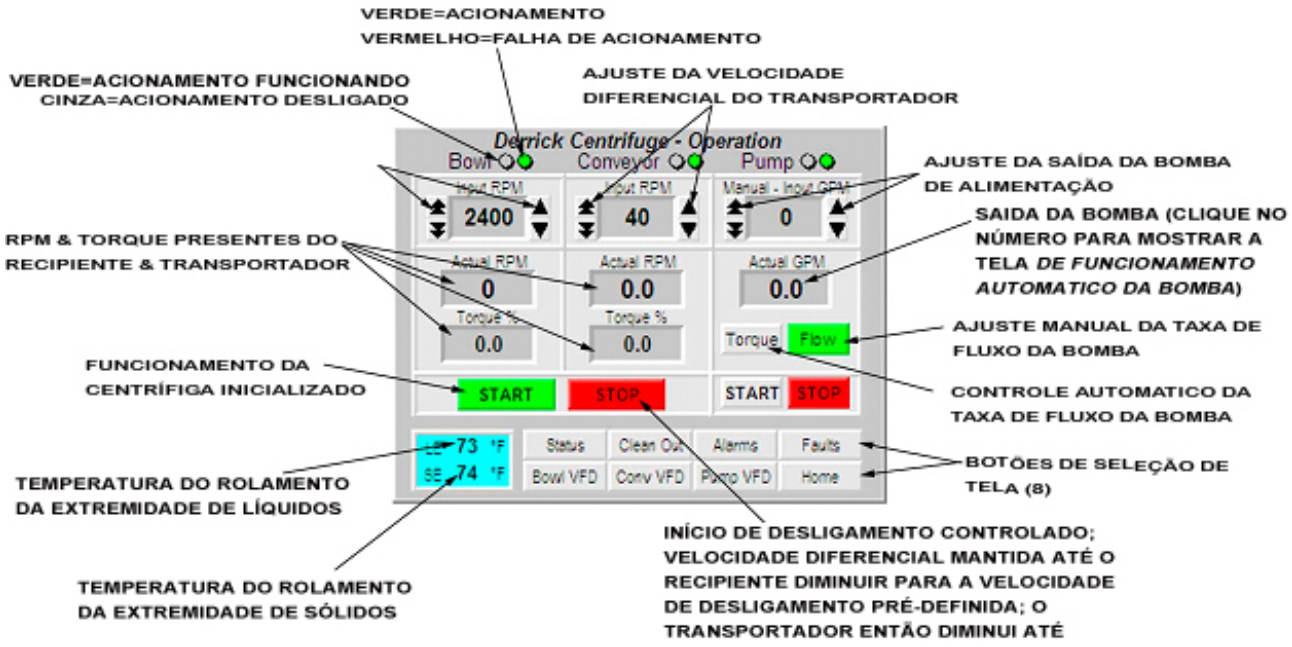


Figura 4-1 Tela de Operação (Folha 1)

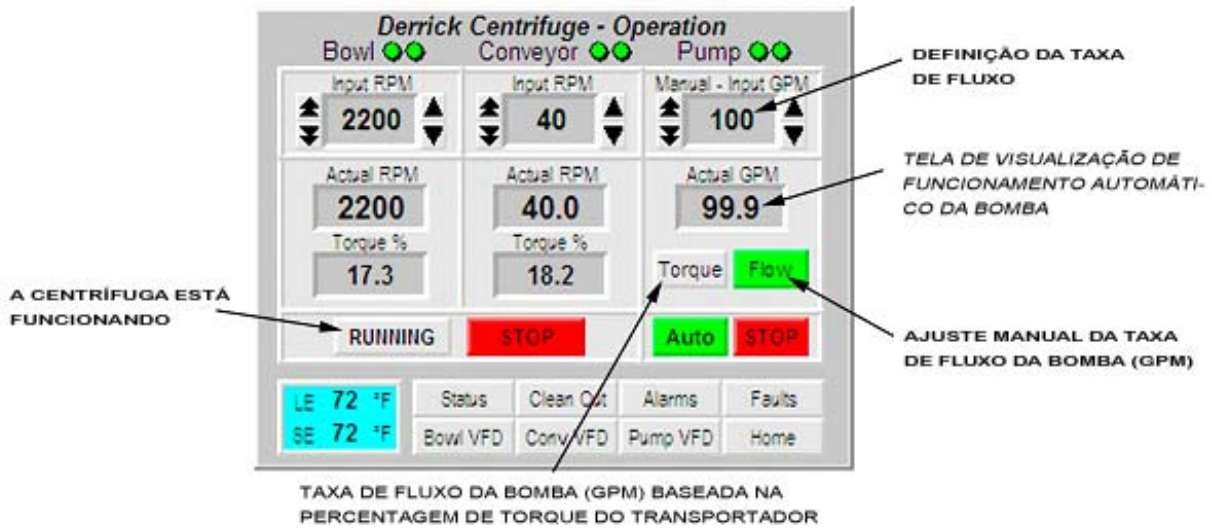


Figura 4-1 Tela de Operação (Folha 2)

Os seguintes parâmetros afetam a operação da centrífuga:

- Taxa de alimentação
- Profundidade do poço
- Velocidade do reservatório
- Velocidade do transportador contínuo

O ajuste de um parâmetro pode produzir a clareza do efluente líquido ou a aridez dos sólidos desejada. Ou o desempenho desejado pode ser atingido com novo ajuste. É importante compreender a interdependência dos parâmetros operacionais. Mudar uma característica resulta em outros efeitos que podem exigir ajustes adicionais.

Exceto pela profundidade do poço, estes parâmetros podem ser ajustados quando a centrífuga está operando. O operador poderá então visualizar os resultados de uma mudança antes de fazer ajustes adicionais. Os parágrafos seguintes descrevem o efeito da mudança de cada parâmetro.

AJUSTE DA TAXA DE ALIMENTAÇÃO

Quando o modo Manual está selecionado na tela *de operação,* o operador manualmente digita a taxa desejada na tela de operação. Se a lama for de baixa viscosidade e densidade, aumentar a taxa de alimentação pode permitir uma maior taxa de processamento. No entanto, como a taxa de alimentação é aumentada, o tempo de permanência no recipiente é reduzido, resultando em mais sólidos na descarga de líquido. Além disso, o torque do transportador pode subir indicando que o transportador está ficando sobrecarregado por mover um maior volume de sólidos na sua velocidade atual. Para reduzir o torque do transportador, a velocidade do recipiente pode ser reduzida, a taxa de alimentação pode ser reduzida, ou a velocidade do transportador pode ser aumentada para mover os sólidos para fora mais rápido. A definição de taxa de alimentação e da taxa real de alimentação é mostrada no painel de controle para auxiliar o operador a fazer ajustes.

VELOCIDADE DO RECIPIENTE

Quanto mais rápida a velocidade do recipiente, mais rápido os sólidos são sedimentados através do poço até a parede externa do recipiente e transportados para fora da centrífuga, mas processamentos mais rápidos resultam em descargas de sólidos mais úmidos. Para reduzir a umidade, a lama/pasta deve permanecer no recipiente por mais tempo, submetendo-a ao processo determinado por um maior período antes de ser transportada para fora da descarga de sólidos. Por outro lado, reduzir a velocidade do recipiente pode ser interessante quando a lama for grossa e pesada, para extrair apenas material de alta densidade ou partículas grandes.

Tanto a definição da velocidade do recipiente quanto à velocidade real do recipiente são mostradas no painel de controle. O percentual de torque do recipiente também é exibido. Esta informação é útil no incremento da velocidade do recipiente para produzir a aridez dos sólidos e velocidade de processamento desejado.

VELOCIDADE DIFERENCIAL DO TRANSPORTADOR CONTÍNUO

Com a polaridade correta da fiação, o transportador responde adequadamente às configurações feitas na tela de operação. Alterar a velocidade diferencial do transportador ajusta a taxa de vazão de sólidos. Em geral, uma velocidade diferencial menor irá produzir sólidos mais áridos, mas reduz a taxa de vazão de sólidos. Aumentar a velocidade de transporte reduz o tempo de secagem, levando à descarga de sólidos úmidos. Reduzir a velocidade do transportador resulta na descarga de sólidos secos. No entanto, a velocidade do transportador excessivamente lenta resulta no acumulo de sólidos no recipiente, o que pode causar uma condição de sobrecarga.

O tempo de secagem é reduzido ao se aumentar à velocidade do transportador, o que aumentará a umidade dos sólidos. Reduzir a velocidade diferencial do transportador aumenta o tempo de secagem, o que irá produzir sólidos mais áridos.

Tanto a definição da velocidade do transportador quanto à velocidade real do transportador são mostradas no painel de controle. Além disso, a percentagem de torque do transportador é mostrada para ajudar o incremento da velocidade do transportador para produzir a aridez dos sólidos e velocidade de processamento desejado.

Como a velocidade diferencial do transportador é controlada pelo PLC referente à definição de velocidade do recipiente, a polaridade da fiação dos componentes eléctricos é fundamental. A polaridade elétrica determina a velocidade real do motor e direção do motor do transportador para qualquer definição de velocidade do recipiente. Por exemplo, com uma velocidade do recipiente determinada em 2000 RPM e uma velocidade diferencial do transportador ajustada para 60 o motor do transportador irá rotacionar em inversão de -1120 RPM.

A relação da velocidade do recipiente-transportador correta depende da polaridade correta da fiação. Se a polaridade for invertida, a mesma definição de velocidade do recipiente de 2000 RPM descrita acima resultaria em uma velocidade diferencial real do transportador de cerca de 17 ao invés da definição de 60.

PROFUNDIDADE DO POÇO

Seis portas de bloqueio ajustáveis (Figura 4-2) são fornecidas na parte superior do recipiente de líquidos para facilitar o ajuste da profundidade do poço, todas as portas devem ser ajustadas igualmente. Um poço mais profundo reduz a área da praia na extremidade de descarga de sólidos do recipiente, que geralmente resulta em uma descarga de sólidos mais úmidos. Por outro lado, ajustar o poço para uma profundidade mais rasa aumenta a área da praia, assim produzindo uma descarga de sólidos mais secos.

A profundidade do poço só pode ser ajustada com a centrífuga totalmente parada e desabilitada. Por esta razão, a profundidade do poço é normalmente ajustada por último. As definições de fábrica da profundidade do poço são normalmente satisfatórias quando utilizado em conjunto com a taxa de alimentação, velocidade do recipiente, e ajustes de velocidade do transportador. No entanto, se os resultados desejados não poderem ser alcançados por outros meios, a profundidade do poço pode exigir uma redefinição.

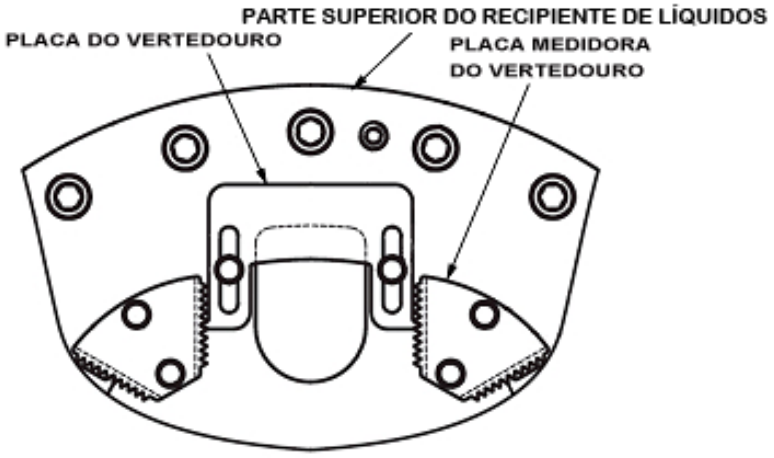


Figura 4-2 Ajuste das placas de Bloqueio

Para ajustar a profundidade do poço, faça o seguinte:

ATENÇÃO! NÃO ABRA A TAMPA OU TENTE AJUSTAR OU FAZER MANUTENÇÃO NA CENTRÍFUGA A MENOS QUE O RECIPIENTE ESTEJA COMPLETAMENTE PARADO.

1. Desligue, bloqueie e etiquete (LOTO) a centrífuga usando o procedimento de Desligamento Normal descrito posteriormente nesta seção.
2. Retire a placa de acesso do lado interno da tapa do invólucro.
3. Solte os parafusos que seguram as placas do açude, mova as placas do açude para o tamanho exigido do lado da abertura do açude, e reaperte os parafusos ao torque especificado na seção 5.
4. Ajuste todas as seis placas de açude para o mesmo diâmetro.
5. Re-instale a placa de acesso sobre a tampa do involucro.

VELOCIDADE DIFERENCIAL/TORQUE DO TRANSPORTADOR

Geralmente, um transportador mais rápido resulta em torque do transportador mais baixo, visto que sólidos são descargados mais rapidamente e geralmente mais úmidos. A redução da velocidade do transportador deve ser feita lentamente e com cautela, permitindo o estado estacionário ser alcançado antes de uma nova redução. Velocidades do transportador mais lentas permitem aos sólidos permanecer no recipiente por mais tempo. Isto pode permitir o acúmulo de sólidos no recipiente se a taxa de entrada exceder a taxa de descarga. Portanto, o torque deve ser monitorado para evitar a sobrecarga.

As definições de limite de torque controlam a redução de alimentação automática e o desligamento da centrífuga. Conforme aumenta o torque do transportador, a taxa de alimentação é reduzida progressivamente. Se o torque continuar a aumentar, a taxa de alimentação é reduzida mais rapidamente. Ao chegar à definição de torque máximo do transportador, a centrífuga é desligada.

A certa velocidade do transportador o motor de acionamento deve reverter a direção para acomodar a relação da velocidade diferencial com o recipiente. Se isso ocorrer, o sistema de controle da centrífuga automaticamente assume o controle da bomba de alimentação para reduzir a sua taxa de fluxo. A mensagem de "Taxa de Fluxo Automática" aparece na tela de operação para alertar os funcionários que a bomba de alimentação está em controle automático.

Quando a taxa de alimentação reduzida é alcançada, um temporizador de 20 segundos é iniciado. Ao chegar o fim do intervalo cronometrado, uma nova velocidade diferencial do transportador é aplicada para corresponder com a taxa de fluxo revista. A taxa de alimentação da bomba retorna à taxa anterior quando a nova velocidade diferencial é alcançada. O controle manual da bomba de alimentação é então restaurado. Esta ação libera a bomba de alimentação do sistema de controle automático e remove a mensagem Taxa de Fluxo Automático da tela.

MENSAGENS DE ALARME E DE FALHA

Durante a operação da centrífuga, poderá aparecer uma mensagem para alertar o operador sobre uma anomalia que necessite de uma intervenção do operador. Mensagens de alarme significam que o problema prevalecente deve ser corrigido ou a centrífuga pode ser desligada

automaticamente. Mensagens de falha informam ao operador que uma falha que exige desligamento automático ocorreu.

Consulte a Seção 5 para mensagens de alarme e as suas causas e ações corretivas.

TEMPERATURAS DO ROLAMENTO

Tendências de temperatura do rolamento podem ser visualizadas em forma gráfica na Tela de Temperatura dos Rolamentos (Figura 4-3). As temperaturas são atualizadas de acordo com um intervalo pré-definido e os botões de deslocamento são fornecidos para facilitar a análise das tendências ao longo do tempo. As temperaturas das extremidades de sólidos e de líquidos são exibidas no lado direito da tela. A tela do Torque do Motor também é acessível a partir da Tela de Temperatura dos Rolamentos. O operador pode retornar à tela Operação ou à tela Inicial usando os botões na parte inferior direita da tela.

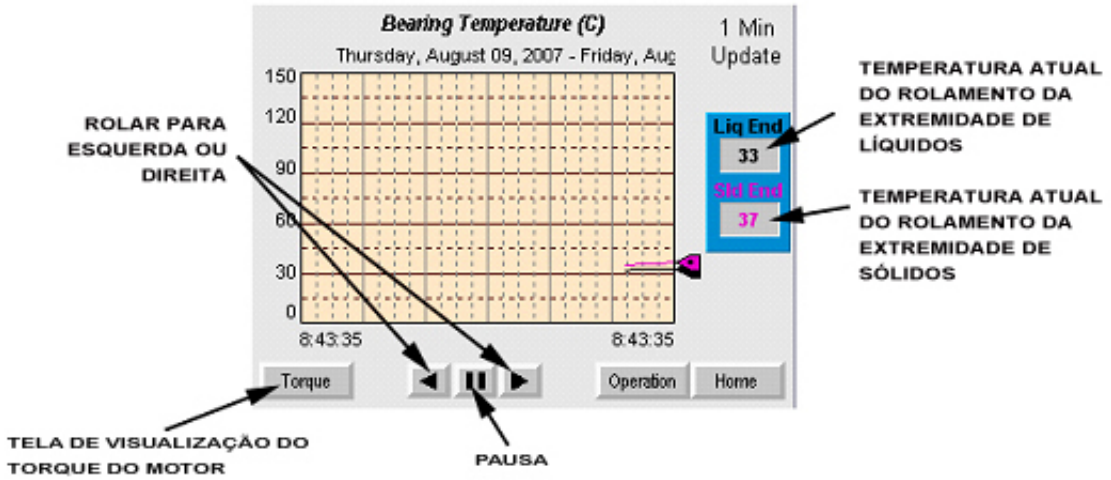


Figura 4-3 Tela de Temperatura dos Rolamentos

TÊNDENCIA DE TORQUE DO MOTOR

O torque do recipiente e do transportador pode ser vistos em forma gráficos na tela de tendência de Torque do Motor (Figura 4-4). Os torques são atualizados de acordo com um intervalo pré-definido (um minuto), e botões de deslocamento são fornecidos para facilitar a análise das tendências ao longo do tempo. Os torques do recipiente e do transportador são exibidos no lado direito da tela. A tela de Temperatura do Rolamento também é acessível a partir da Tela de Torque do Motor. O operador pode retornar à tela Operação ou à tela Inicial usando os botões na parte inferior direita da tela.

TÊNDENCIA DE TORQUE DO MOTOR (CONT.)

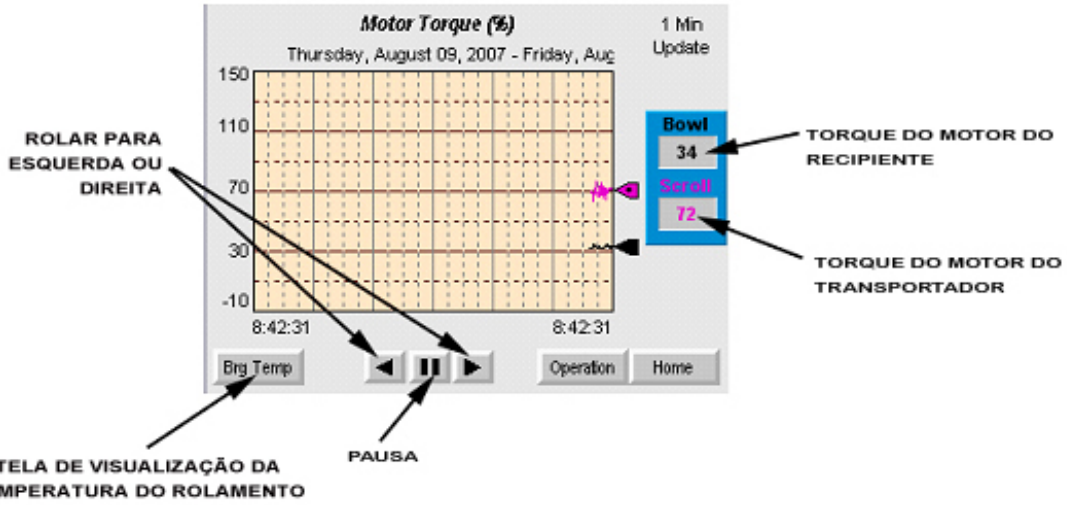


Figura 4-4 Tela de Tendência de Torque do Motor

DIAGNÓSTICOS DE SISTEMA

Diagnósticos de sistema incorporados analisam continuamente o sistema de controle em busca de falhas. A tela de Diagnósticos (Figura 4-5) auxilia na resolução de problemas, apresentando qualquer falha nas áreas críticas da centrífuga. O estado operacional atual do Recipiente, do Transportador e dos VFDs da Bomba, bem como os sensores de velocidade e temperatura são exibidos na tela. Leituras analógicas em mA são exibidas na parte inferior da tela dos sensores de temperatura do rolamento principal e sensor de velocidade do recipiente. A tela é acessível a partir da tela Inicial, bem como as três telas do VFD.

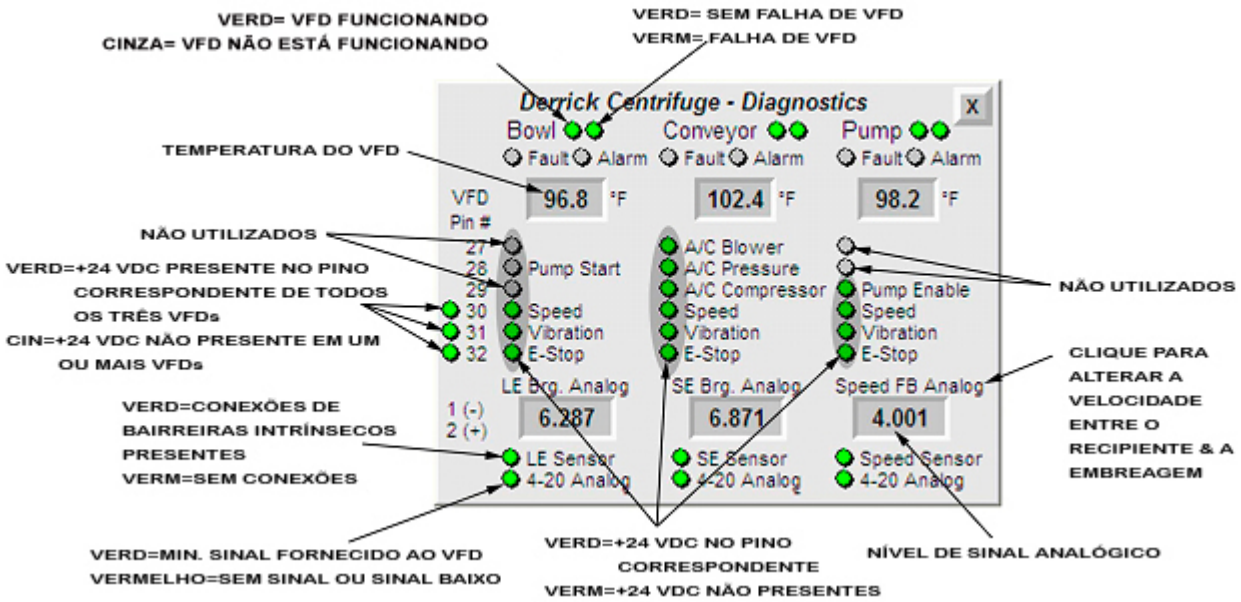


Figura 4-5 Tela de Diagnósticos

STATUS DO DESEMPENHO

Informações sobre o desempenho atual são mostradas na tela *Status da Centrífuga* (Figura 4-6). Os parâmetros exibidos incluem temperaturas de rolamentos, velocidades do recipiente e embreagem, e condição do sensor, status dos dispositivos de segurança (interruptor de vibração, parada de emergência e excesso de velocidade do recipiente), funcionamento do condicionador de ar, e horas de funcionamento. O status de funcionamento do motor do compressor do ar condicionado, motor do ventilador do evaporador e pressão do refrigerante são mostrados. Sair desta tela volta à tela anterior. As falhas são indicadas por uma mudança de cor de verde para vermelho e pela exibição de uma palavra correspondente.

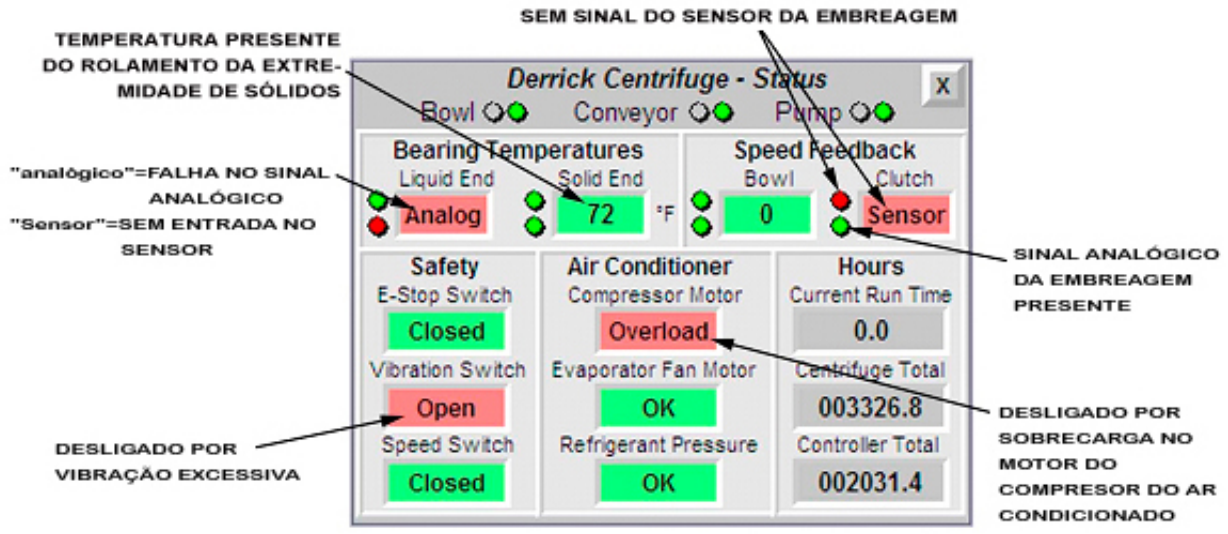


Figura 4-6 Tela de Status da Centrífuga

ALARMES

A tela de Alarmes (Figura 4-7) permite ao operador examinar e reconhecer as mensagens de alarme ativas. Cada alarme é listado com o seu estado, a data e a hora recebida e descrição. Botões são fornecidos na parte inferior da tela para facilitar a navegação entre os alarmes. As mensagens podem ser confirmadas individualmente ou todos os alarmes poderão ser confirmados simultaneamente. Provisões são incluídas para classificar os alarmes em ordem de ocorrência e botões são incluídos para voltar à tela Operação ou à tela Inicial.

ALARMES (CONT.)

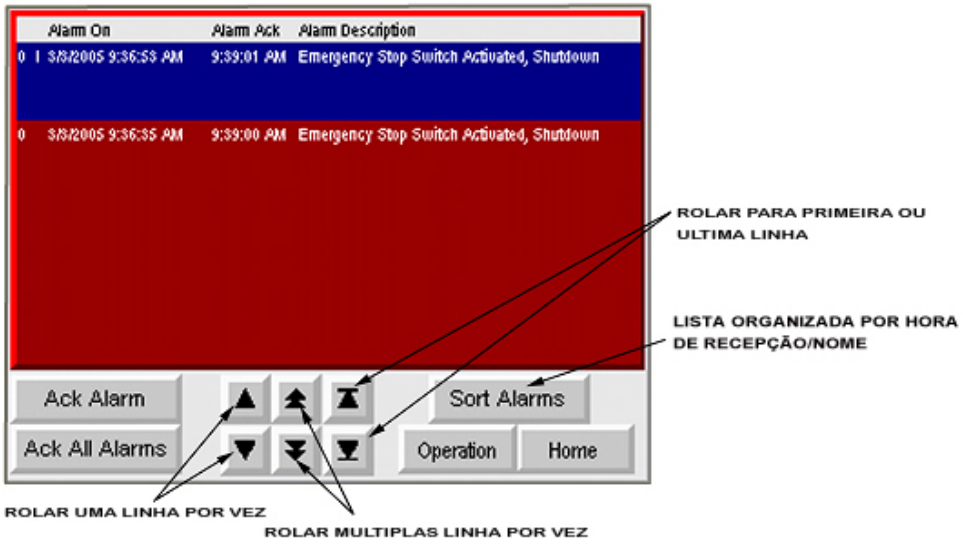


Figura 4-7 Tela de Alarmes

STATUS DO VFD

Uma tela de status é fornecida para cada VFD (Figura 4-8 até 4-10) para permitir a revisão das informações sobre o status atual do VFD. Quando selecionada a partir da tela *Operação,* a tela de status permite ao operador visualizar fatores operacionais tais como, qualquer alarme presente, saída de força, direção do motor (avançando ou parado), temperatura interna do VFD, velocidades do motor e do recipiente e torque do motor. Clicar no campo temperatura exibe a tela de tendência da temperatura do VFD (Figura 4-11).

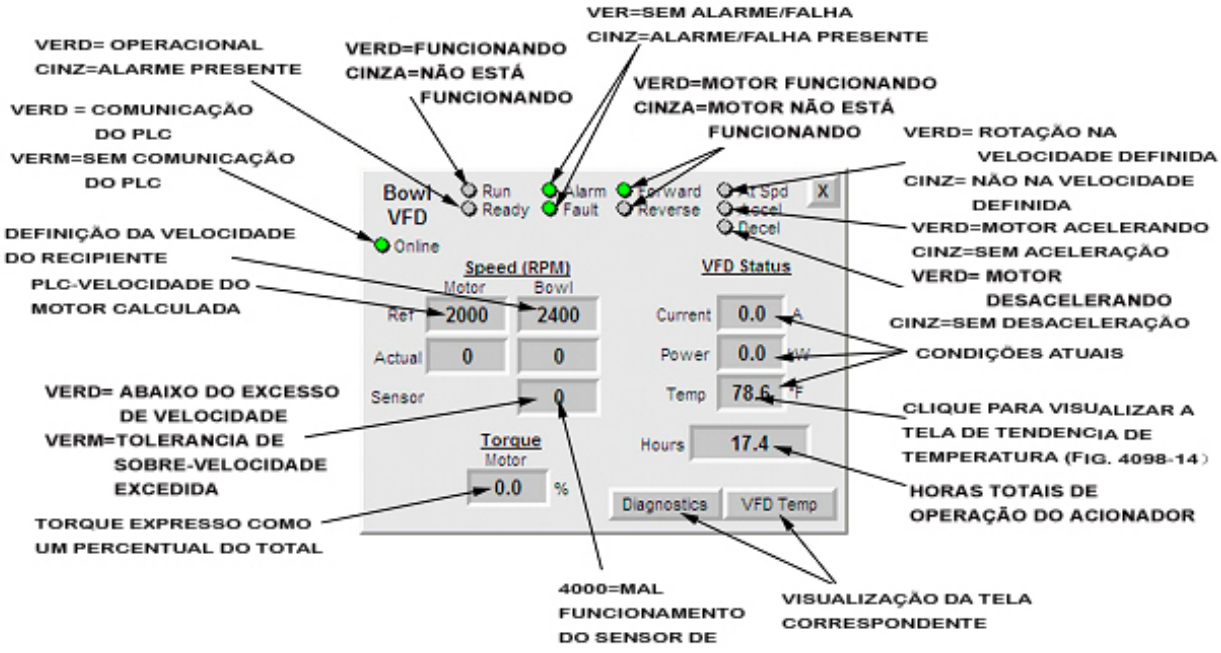


Figura 4-8 Tela do VFD do Recipiente

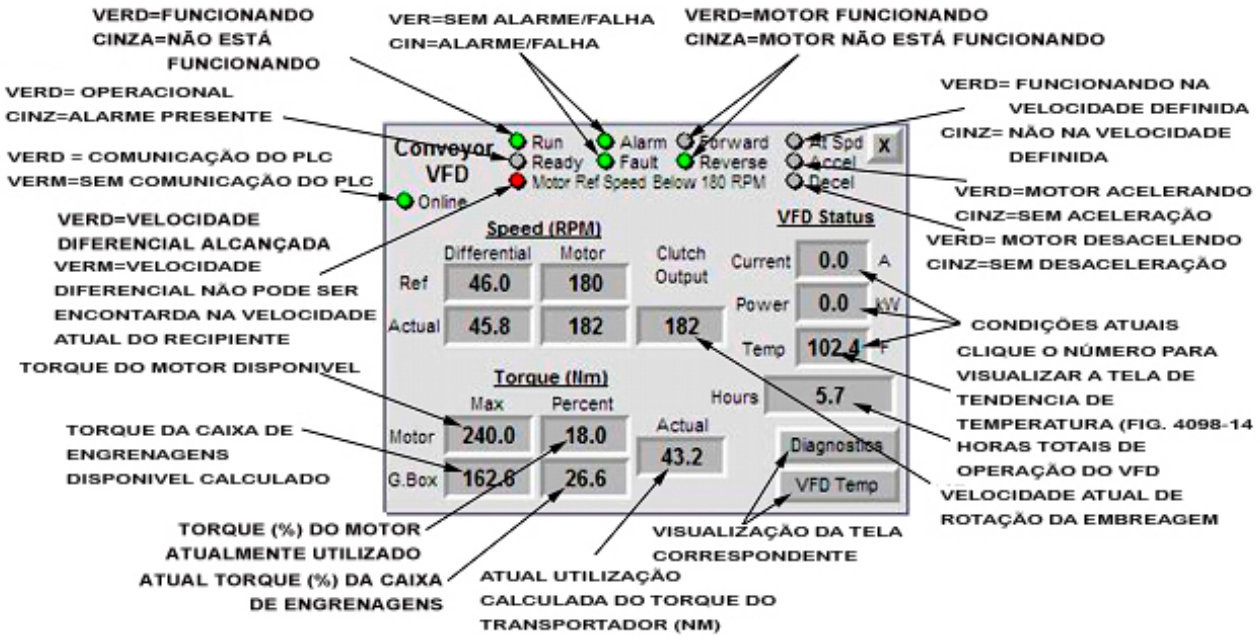


Figura 4-9 Tela do VFD do Transportador

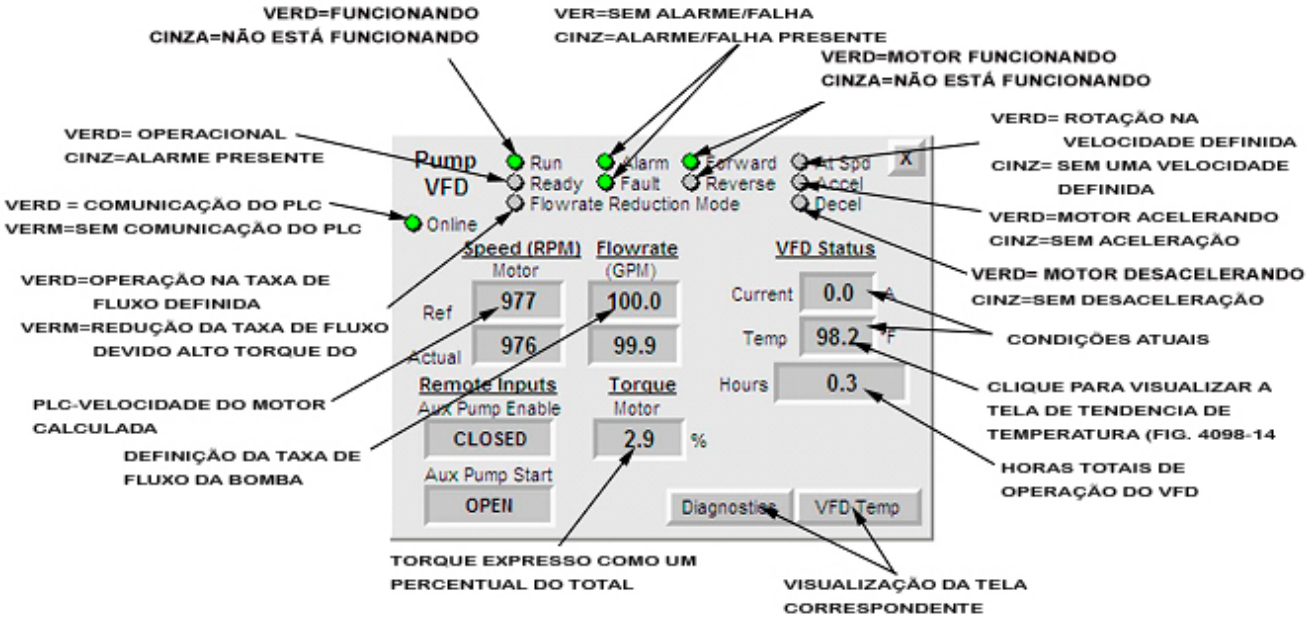


Figura 4-10 Tela do VFD da Bomba

STATUS DO VFD (CONT.)

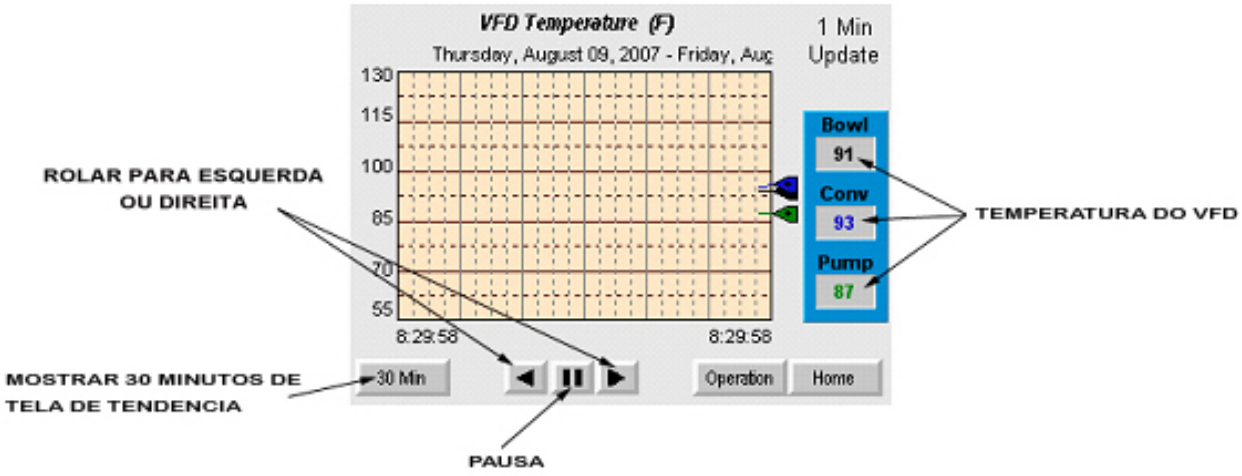


Figura 4-11 Tela Tendência da Temperatura do VFD

REINICIALIZAÇÃO DE FALHA VFD

A tela de *Reinicialização de Falha* (Figura 4-12) informa o operador da disponibilidade de cada VFD -- Com Falha ou Sem Falha -- e permite reinicializar um VFD com falha. A tela pode ser selecionada a partir da tela *Limpeza* ou da tela *Operação.* Se o alto torque do transportador provocar uma redução no fluxo da bomba, a mensagem "Redução da Taxa de Fluxo" é exibida na tela *Operação* ou *Limpeza* para informar ao operador que a bomba está operando a uma taxa de fluxo reduzida. Essa mensagem também aparece na tela *Reinicialização de Falhas.* Após a remoção da causa da baixa vazão, RESTAURAR é selecionado na tela *Reinicialização de Falha* para voltar a bomba para a vazão normal. Depois de qualquer falha, certifique-se que a centrífuga parou completamente antes de tentar recomeçar.

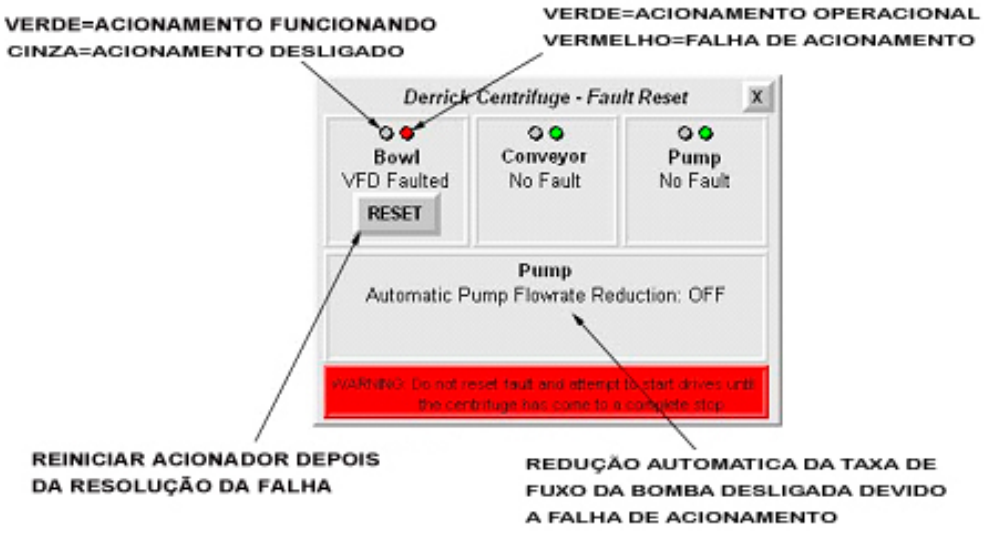


Figura 4-12 Tela Reinicialização de Falha

TELA DE CONFIGURAÇÃO

A tela *Configuração* (Figura 4-13) permite ao operador visualizar a versão do software instalado no PLC e painel de controle (HMI), configurações do recipiente e velocidade diferencial e as características da bomba de alimentação, bem como definir as preferências pessoais. O operador pode ajustar o brilho da tela do painel de controle e selecionar as unidades de temperatura (°C ou °F), que serão exibidas nas outras telas.

Opções são fornecidas para seleção das telas *Login, Diagnósticos,* ou *Inicial.* Se *Login* for selecionado, aparecerá um pedido para inserir um nome de usuário e senha, disponível apenas para pessoal autorizado. Quando a tela for acessada, o pessoal autorizado pode definir ou alterar parâmetros do recipiente, transportador e VFD das bombas.

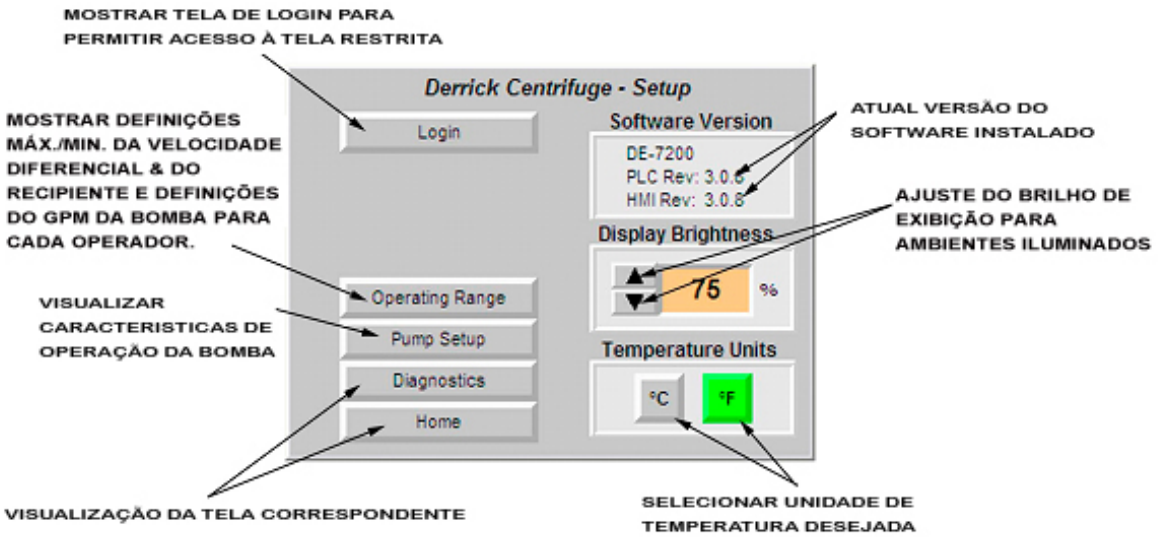


Figura 4-13 Tela de Configuração

TELA DE CONFIGURAÇÃO DA BOMBA

As características de funcionamento da bomba são visualizadas na tela de *Configuração da Bomba* (Figura 4-14). Informações digitadas das especificações de funcionamento da bomba e motor de acionamento são exibidas para mostrar ao operador as informações atuais do motor e da bomba.

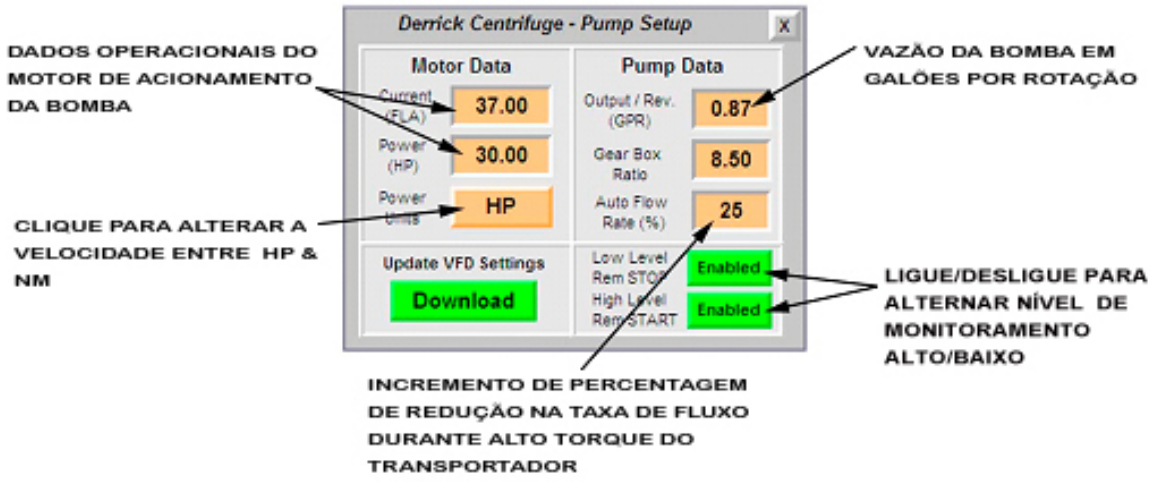


Figura 4-14 Tela de Configuração da Bomba

LOGIN

A tela de *Login* (Figura 4-15) é acessada a partir da tela de *Configuração* (Figura 4-13). Ela permite que o pessoal autorizado digite uma senha necessária para mostrar telas restritas. Essas telas permitem ao pessoal de supervisão reconfigurar características operacionais e os parâmetros que controlam a operação da centrífuga.

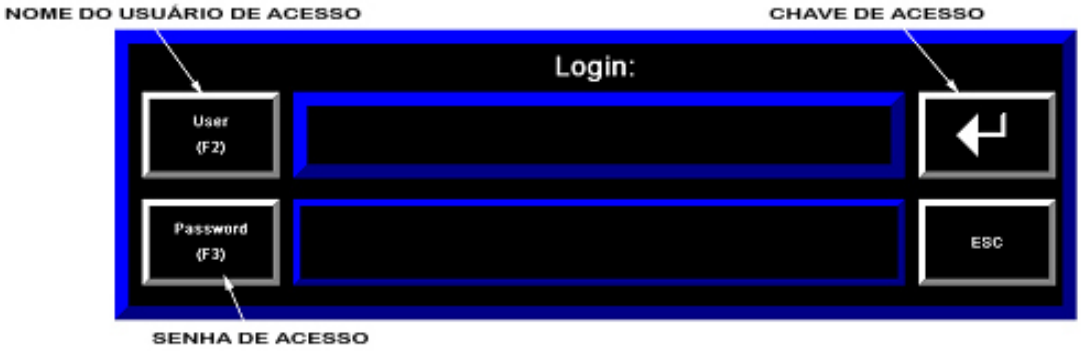


Figura 4-15 Tela de Login

LIMPEZA

A tela Limpeza (Figura 4-16) é usada para definir parâmetros para operar o recipiente e/ou transportador para remover o material processado acumulado que está impedindo a rotação. Com esta tela em exibição, o operador seleciona o RPM desejado para o processo de limpeza do recipiente e transportador. Durante a limpeza, os percentuais reais de RPMs e torque são exibidos abaixo dos pontos definidos. Provisões são incluídas para selecionar as opções de limpeza automática ou manual.

Quando o processo de limpeza expirar ou for interrompido pelo operador, a tela *Operação* ou a tela *Falhas* podem ser exibidas.

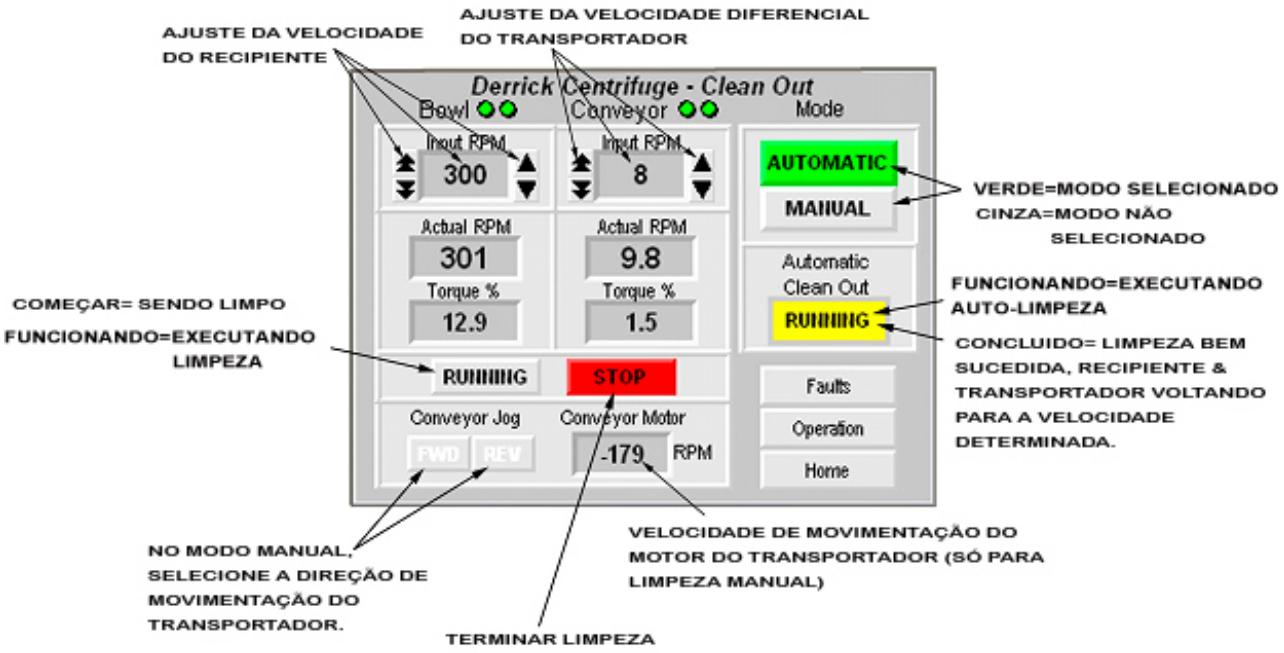


Figura 4-16 Tela de Limpeza

Se a redução automática da velocidade da bomba é incapaz de limpar sólidos provenientes do transportador, o torque vai continuar a subir e a centrífuga será desligada. O procedimento de limpeza deve então ser usado para limpar os sólidos comprimidos e retornar a centrífuga para o status de operacional. Os parágrafos seguintes explicam as duas opções de limpeza: automática e manual.

Limpeza Automática

Quando a opção automática é selecionada, o sistema irá realizar um ciclo de limpeza por um período pré-estabelecido. O recipiente funciona a 300 RPM para à frente, enquanto o transportador opera em uma velocidade que varia de 8-30 RPM para à frente. Se resistência excessiva for encontrada durante a limpeza, o sistema fará uma pausa e alertará o operador que a limpeza automática foi incapaz de limpar a centrífuga. A intervenção do operador é então necessária para repetir a operação de limpeza automática.

Limpeza Manual

Se a opção limpeza manual for selecionada, o operador pode escolher movimentar o transportador para frente e para trás, com o recipiente configurado a zero RPM. Se desejar, no entanto, o operador pode escolher operar o recipiente bem como o transportador. A rotação inversa do transportador é regida por um temporizador que termina a operação reversa após um intervalo pré-definido. O objetivo principal do modo de limpeza manual é permitir movimentar o transportador em um esforço para remover o material compactado.

DESLIGAMENTO NORMAL

O procedimento de desligamento normal deve ser usado para uma parada de operação controlada. O desligamento normal é executado para as atividades de rotina, tais como a limpeza, lubrificação, inspeção ou ajuste.

Note! Desligamento e descarga adequados do recipiente podem impedir alta vibração na inicialização seguinte.

DESLIGAMENTO NORMAL	
Passo	**Procedimento**
1	Parar a bomba de alimentação.
2	Inicialmente continuar o fornecimento de água fresca de descarga para remover todos os resíduos sólidos provenientes do transportador e do recipiente. Continue lavando de 3 a 5 minutos após a bomba de alimentação ser desligada. Independente do período de desligamento, o transportador opera com um diferencial de velocidade pré-definido enquanto o recipiente desacelera até parar. Este processo limpa o recipiente durante o desligamento. A força centrífuga força o líquido de descarga contra a parede do recipiente durante o processo de descarga. À medida que a velocidade cai gradualmente durante o período de desligamento, a calha de sólidos também pode ser descarregada. Conexões no lado da dobradiça do invólucro permitem a ligação de uma mangueira para lavar o exterior do conjunto rotativo e interior do conjunto do invólucro.
3	Motor de acionamento da caixa de velocidades é desligado automaticamente quando a velocidade do recipiente cai para menos de 200 RPM.
4	Após a paralisação da centrífuga (que pode demorar mais de 10 minutos após a interrupção de energia para o motor do recipiente), a centrífuga deve ser reiniciada por 20 a 30 segundos para limpar os sólidos liberados durante o colapso da água-anel.
5	Execute o procedimento de limpeza automática.
6	Desligue o suprimento de energia elétrica da máquina e bloqueie e etiquete (LOTO) a máquina.
7	Para gabinetes com sistema de drenagem, desligue a alimentação de ar comprimido para a Unidade do gabinete de drenagem.

DESLIGAMENTOS AUTOMÁTICOS

A centrífuga foi construída com recursos de segurança para proteger o equipamento. Esses recursos irão resultar em desligamento automático da centrífuga antes que ocorram danos. Os parágrafos seguintes descrevem estes desligamentos automáticos.

Vibração Excessiva

Vibração excessiva da centrífuga ira fazer com que o interruptor de vibração interrompa a energia elétrica para o relé de execução da centrífuga, desligando a máquina. Vibração excessiva como essa pode ocorrer durante a inicialização ou o funcionamento normal devido à queda de um paredão formado pelo bolo ou outra condição desequilibrada do recipiente. A máquina poderá ser reiniciada pressionando o botão restaurar do interruptor de vibração e, em seguida, usando o procedimento de Inicialização normal acima.

Se a máquina continuamente trepidar durante a inicialização normal, lave o recipiente com água fresca durante a execução da limpeza automática de rotina.

Temperaturas do Rolamento Principal

Sensores de temperatura são instalados no rolamento principal das extremidades de líquidos e sólidos, e ligados ao PLC. As temperaturas dos rolamentos são continuamente exibidas na tela Operação. Uma mensagem de alarme é exibida no painel de controle quando a temperatura dos rolamentos ultrapassar 225°F (107°C). Se a temperatura subir para 250°F (120°C), uma mensagem de falha aparece e a centrífuga é desligada. Temperaturas de rolamentos excessivamente altas geralmente indicam falha do rolamento, o que pode resultar de lubrificação inadequada ou excessiva, contaminação ou desgaste severo. Consulte a Seção 5 para procedimentos de substituição de rolamento principal.

Velocidade Excessiva do Recipiente

Um sensor que detecta a velocidade de rotação do recipiente apresenta uma entrada para o PLC, que produz uma exibição contínua velocidade real do recipiente nas telas Operação e VFD do Recipiente. Uma mensagem de falha é exibida e a centrífuga é desligada imediatamente se a velocidade subir a 3100 RPM. Para reiniciar a centrífuga, permita que o recipiente pare completamente, verifique e remova a causa do excesso de velocidade, conforme descrito na Seção 5. Depois de corrigir o(s) defeito(s), reiniciar a máquina usando o procedimento normal de inicialização acima, e verificar a velocidade da embreagem novamente.

Acionamento da Embreagem do Transportador

Um sensor detecta a velocidade de rotação do torque da caixa de engrenagens limitando a meia-embreagem no eixo da caixa de engrenagens. O sensor fornece uma entrada ao PLC que continuamente exibe a velocidade real da embreagem na tela de Status e do VFD do transportador. Se o diferencial de velocidade entre o motor de acionamento do transportador e o lançamento da embreagem chegar a 50 RPM, o sensor de velocidade da embreagem fornece uma entrada para o PLC resultando em uma mensagem de alarme do acionamento da embreagem exibida no painel de controle. Uma mensagem de falha é exibida e a centrífuga é desligada imediatamente. Para reiniciar a centrífuga, permita que o recipiente pare completamente e corrija qualquer defeito(s), conforme descrito na Seção 5. Depois de corrigir o(s) defeito(s), reiniciar a máquina usando o procedimento normal de inicialização acima, e verificar a velocidade da embreagem novamente (como mostrado na tela do VFD do transportador).

DESLIGAMENTO DE EMERGÊNCIA

Para parar a centrífuga em caso de emergência, pressione a tecla PARADA DE EMERGÊNCIA no gabinete de controle ou na centrífuga selecione PARAR na tela Operação ou desconecte a energia elétrica para o aparelho.

Pressionar PARADA DE EMERGÊNCIA imediatamente remove a energia do recipiente, transportador, motores e bombas, permitindo ao recipiente parar. Isso pode levar mais de 15 minutos, dependendo velocidade do recipiente e quantidade de material dentro do recipiente. Para parar o recipiente mais rápido, pressione o botão PARAR na tela Operação ou exiba a tela do VFD do Recipiente e pressione o botão RECIPIENTE ESTÁ PARANDO. No entanto, antes de pressionar este botão, todos os alarmes/falhas devem ser apurados.

SEÇÃO 5 - MANUTENÇÃO

GERAL

Esta seção descreve os procedimentos preventivos e de manutenção corretiva da centrífuga DE-7200 VFD. Procedimentos óbvios foram omitidos. Antes de inicializar qualquer manutenção da centrífuga, desligar, bloquear (LO), e etiquetar (TO) o equipamento.

	ATENÇÃO! ALTA TENSÃO PODE ESTAR PRESENTE. SEMPRE ABRA O FUSÍVEL QUE DESCONECTA O FORNECIMENTO DE ELETRICIDADE AO EQUIPAMENTO, E FECHE E DESLIGUE O SUPRIMENTO DE ENERGIA ANTES DE EXECUTAR QUALQUER PROCEDIMENTO DE MANUTENÇÃO.
	ATENÇÃO! A FALHA NO USO DE ÓCULOS DE SEGURANÇA PODE RESULTAR EM LESÃO SÉRIA NO OLHO OU PERDA PERMANENTE DA VISÃO. OS ÓCULOS DE SEGURANÇA DEVEM SER USADOS SEMPRE QUE QUALQUER PROCEDIMENTO DE MANUTENÇÃO FOR EXECUTADO.

MANUTENÇÃO PREVENTIVA

A manutenção preventiva consiste em inspeção, limpeza e lubrificação. Estes procedimentos de rotina vão garantir máxima vida útil e operação livre de problemas. Enquanto a programação de manutenção apresentada nesta seção deve ser flexível, as modificações devem ser baseadas na experiência de operação do equipamento em suas instalações. Um registo de manutenção deve ser mantido para ajudar a estabelecer um cronograma de manutenção preventiva, bem como monitorar e ajustar o cronograma conforme necessário durante a vida útil do equipamento.

Considere os seguintes fatores ao estabelecer um cronograma de manutenção preventiva:

- Ciclo de serviço
- Temperatura ambiente
- Ambiente Operacional

O cronograma de manutenção preventiva recomendado é apresentado na tabela abaixo. Consulte a tabela de lubrificação na página seguinte para lubrificantes aplicáveis e as quantidades.

MANUTENÇÃO PREVENTIVA (CONT.)

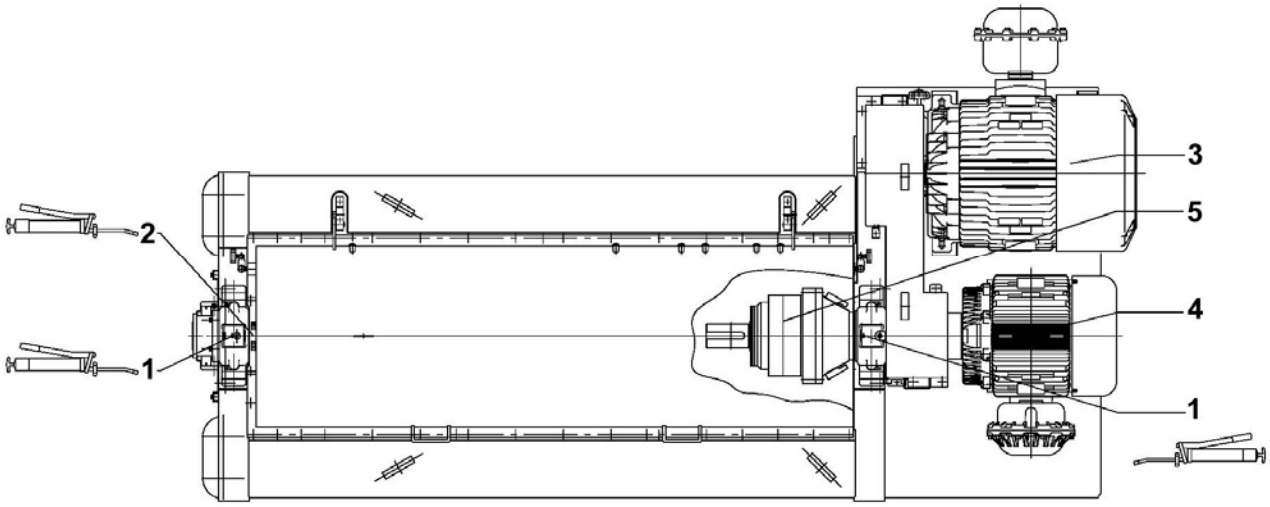
PROGRAMAÇÃO DE MANUTENÇÃO PREVENTIVA	
Ação	**Frequência**
Inspecione a conexão de alimentação procurando por vazamentos, e aperte a conexão do flange fortemente conforme for necessário.	A cada turno
Inspecione se há vazamentos nas conexões de descarga de líquidos. Aperte a conexão para evitar vazamentos.	A cada turno
Engraxe os rolamentos principais (Figura 5-1).	A cada 40 Horas
Engraxe os rolamentos do transportador (Figura 5-1).	A cada 500 Horas
Verifique o óleo da caixa de engrenagens de acionamento do transportador.	A cada 500 Horas
Troque o óleo da caixa de engrenagens de acionamento do transportador (Figura 5-1).	A cada 2500 Horas
Remova o conjunto de componentes de alimentação, limpe o interior do cano, e reinstale.	A cada 40 semanas
Verifique e remova sólidos acumulados do interior e exterior do invólucro.	A cada 40 horas ou quando necessário
Remova a cobertura da correia, examine a correia procurando por danos e verifique/ajuste a tensão.	A cada 160 semanas
Inspecione o engate da embreagem acoplada entre o motor de acionamento do transportador e o eixo da caixa de engrenagens.	Por mfctr*****

** Inspecione por recomendações do fabricante (ver seção 10).*

ROLAMENTOS LUBRIFICADOS

Os rolamentos principais, rolamento do transportador, motor de acionamento do recipiente, motor de acionamento do transportador estão equipados com graxeiras. Limpe cada equipamento antes da lubrificação, e injete o tipo e quantidade especificada de graxa, listados na Figura 5-1.

ATENÇÃO! SÓ USE PRODUTOS ESPECIFICADOS. ANTES DE LIGAR A BOMBA DE GRAXA, RETIRE TODOS OS VESTÍGIOS VISÍVEIS DA GRAXA NO EQUIPAMENTO.



Nº	Localização	Quantidade	Intervalo	Tipo	Notas de Aplicação
1	Rolamentos Principais	6 cm^3 (3 apertos)	40 Hrs	Shell Albida EP2	Centrífuga funcionando Bomba de graxa manual
2	Rolamento do Transportador	Portas externas de saída engraxadas	500 Hrs	Shell Albida EP2	Centrífuga parada Bomba de graxa manual
3	Motor de acionamento do recipiente	Consulte o manual da Maratona Electric na Seção 10 para obter detalhes de lubrificação.			Centrifugar parada
4	Motor de acionamento do transportador				Centrifugar parada
5	Caixa de engrenagem de acionamento do transportador contínuo	5 qts (4.9 l)	2500 Hrs	Mobil SHC629	Primeira troca de óleo após 500 horas. Troque o óleo com a centrífuga parada, verifique o nível quando quente (veja *Verificando o Nível de Óleo da Caixa de Engrenagens* nesta seção)

Figura 5-1 Pontos de Lubrificação do Rolamento

VERIFICAÇÃO DO NÍVEL DE ÓLEO DA CAIXA DE ENGRENAGEM

Verifique o nível do óleo a cada 500 horas de funcionamento, com a caixa de engrenagem quente. Para verificar o nível, faça o seguinte:

1. Desligue, bloqueie e etiquete (LOTO) a centrífuga.

2. Remova os parafusos que prendem a tampa superior, e abra a tampa.
3. Gire a caixa de engrenagens até o entalhe do alojamento está no ponto morto superior (Figura 5-2).
4. Remova o dispositivo de recarga, e verificar que o nível do óleo está na abertura. Se o nível estiver baixo, reabasteça com o óleo recomendado.
5. Reinstale o dispositivo de recarga, e aperte bem.
6. Feche e proteja a tampa superior.

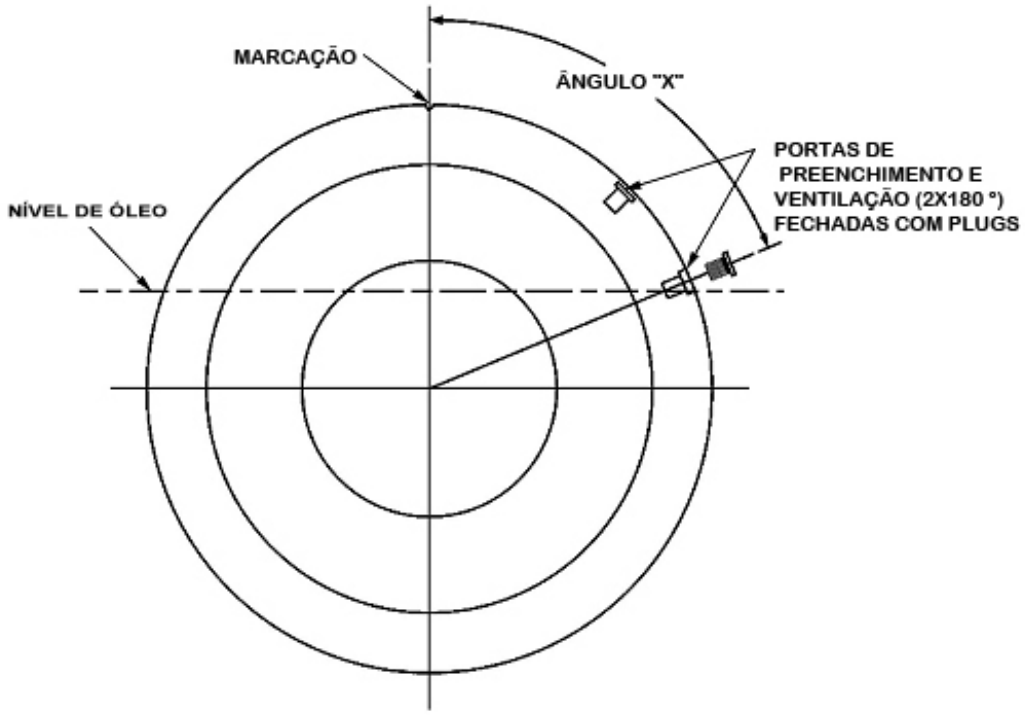


Figura 5-2 verificação do nível de óleo da caixa de engrenagem

TROCA DE ÓLEO DE CAIXA DE ENGRENAGEM

Troque o óleo da caixa de engrenagem nos intervalos listados na Figura 5-1. Para trocar o Óleo, faça o seguinte:

1. Desligue, bloqueie e etiquete (LOTO) a centrífuga.
2. Remova os parafusos que prendem a tampa superior, e abra a tampa.
3. Coloque um recipiente adequado, capaz de reter 5 quarts (4,9 litros) de Óleo, abaixo da caixa de engrenagem.
4. Girar a caixa de engrenagem até um plugue de drenagem estar no fundo da caixa de engrenagem.
5. Retire os dois plugues do topo da caixa de engrenagens para permitir a entrada de ar e, assim, facilitar a drenagem.
6. Retire o plugue da parte inferior da caixa de engrenagem para drenar o óleo.

7. Após a drenagem total da caixa de engrenagem, reinstale e aperte o plugue do fundo.
8. Recarregue a caixa de engrenagem com produtos e quantidades listadas.
9. Reinstale o dispositivo de recarga, e aperte bem.
10. Feche e proteja a tampa superior.

MANUTENÇÃO DE COMPONENTE

Antes de inicializar qualquer manutenção da centrífuga, desligar, bloquear (LO), e etiquetar (TO) o equipamento.

ATENÇÃO! ALTA TENSÃO PODE ESTAR PRESENTE. SEMPRE ABRA O FUSÍVEL QUE DESCONECTA O FORNECIMENTO DE ELETRICIDADE AO EQUIPAMENTO, E FECHE E DESLIGUE O SUPRIMENTO DE ENERGIA ANTES DE EXECUTAR QUALQUER PROCEDIMENTO DE MANUTENÇÃO.

ATENÇÃO! A FALHA NO USO DE ÓCULOS DE SEGURANÇA PODE RESULTAR EM LESÃO SÉRIA NO OLHO OU PERDA PERMANENTE DA VISÃO. OS ÓCULOS DE SEGURANÇA DEVEM SER USADOS SEMPRE QUE QUALQUER PROCEDIMENTO DE MANUTENÇÃO FOR EXECUTADO.

ACIONAMENTO POR CORREIAS

As correias motrizes devem ser esticadas periodicamente e substituídas se a inspeção revelar danos ou deterioração. Para esticar e/ou substituir as correias, faça o seguinte:

ATENÇÃO! SEMPRE PERMITA QUE O CONJUNTO ROTATORIO DESACELERE ATÉ UMA PARADA COMPLETA ANTES DE REMOVER O CINTO DE SEGURANÇA.

1. Desligue, bloqueie (LO) e etiquete (TO) energia elétrica para a centrífuga.
2. Remova a proteção da correia.
3. Afrouxe o parafuso de ajuste e os parafusos de montagem que prendem a meia embreagem limitadora de torque no eixo do motor de acionamento do transportador (Figura 5-3), e deslize a meia embreagem em direção do motor até onde a extremidade do eixo do motor for visível.
4. Desapertar os parafusos que prendem o motor de acionamento do recipiente à base, rotacione o parafuso de tensão para afrouxar as correias, e remova as correias do recipiente e as polias do motor por manobra externa entre o motor de acionamento e o eixo do transportador.
5. Instale novas correias sobre o motor de acionamento do recipiente e as polias do recipiente.
6. Vire o parafuso de tensão para aplicar tensão à correia. Aplique a tensão da correia suficiente para permitir uma deflexão de 1/2" (13 mm) quando pressionada com uma força de 17 lb (75 N) no meio da correia (Figura 5.4). A tensão correta vai evitar derrapagens sem sobrecarregar os mancais. Depois da tensão correta está definida, aperte os parafusos de retenção da base do motor para fixar o motor.

CORREIA MOTRIZ (CONT.)

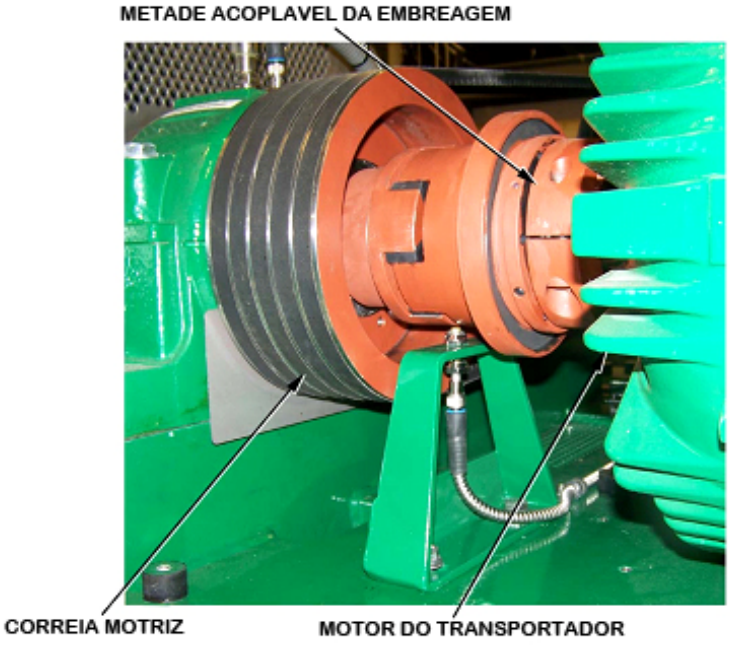


Figura 5-3 Embreagem de Acionamento do Transportador

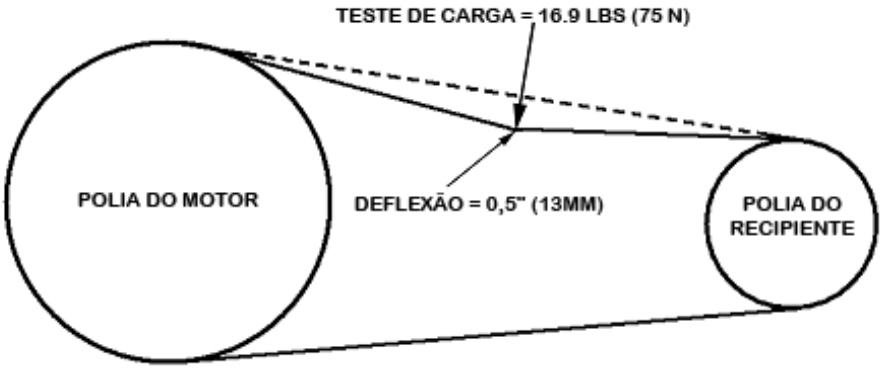


Figura 5-4 Tencionamento da Correia Motriz

7. Deslize a meia embreagem de acionamento do motor de volta ao engate com a meia caixa de engrenagem, e defina a folga entre as metades da embreagem em cerca de 0,1875" à 0.250" (4.8 mm à 6.4 mm) e, em seguida a posicione a embreagem axialmente para que a metade do spider estar alinhada com o sensor de proximidade.
8. Gire a embreagem do eixo do motor até o parafuso de ajuste está alinhado com a chave do eixo, e aperte o parafuso de ajuste. Aperte os parafusos de montagem na meia embreagem do motor em 184 libra-pé (250 Nm).
9. Instale e fixe a correia de segurança

MANUTENÇÃO DO CONJUNTO ROTATIVO

A manutenção do conjunto rotativo requer desmontagem e só pode ser realizada com o conjunto fora do invólucro. Vibração ou ruído excessivo durante o funcionamento da centrifuga pode indicar rolamentos principais ou do transportador defeituosos. Se essas condições são evidentes, os rolamentos devem ser inspecionados a procura de folgas e substituído se necessário como descrito posteriormente nesta seção.

Remoção

O conjunto rotativo deve ser removido para uma limpeza completa, substituição de rolamento, ou para realização da inspeção e manutenção. Para remover o conjunto rotativo, faça o seguinte:

ATENÇÃO! PARA EVITAR SÉRIAS LESÕES FISICAS CERTIFIQUI-SE DE QUE O EQUIPAMENTO ESTÁ FECHADO, TRANCADO, DESENERGISADO, E TENHA PARADO DE GIRAR ANTES DE EXECUTAR AJUSTES E/OU MANUTENÇÃO.

1. Desligue a alimentação e desative, bloqueie e etiquete (LOTO) a energia elétrica para a centrífuga. Permita ao conjunto rotativo parar completamente.
2. Desconecte a tubulação de alimentação do flange do componente de alimentação.
3. Retire os parafusos que prendem a correia de segurança ao invólucro, e levante e remova o protetor.
4. Remova os parafusos que prendem a tampa do invólucro ao invólucro, e abra a tampa.
5. Soltar os parafusos que prendem a meia embreagem limitadora de torque ao eixo do motor de acionamento do transportador Figura 5-5, escorregue a metade de acoplamento em direção ao motor até onde a extremidade do eixo do motor for visível, e remova o spider.
6. Solte as porcas que prendem o motor de acionamento do recipiente à base, vire o parafuso de tensão para liberar a tensão, e remova a correia da polia do recipiente.
7. Remova os parafusos, arruelas de travamento e arruelas lisas que prendem o pillow block à base nas extremidades de líquidos e sólidos (Figura 5-6) e remova os pinos de alinhamento dos pillow blocks.
8. Conecte um guindaste capaz de levantar pelo menos 4000 libras (1800 kg) ao conjunto rotativo.
9. Equilíbre adequadamente as correias de elevação para garantir que o conjunto permaneça na horizontal durante o levantamento e lentamente suspenda o conjunto rotativo até deixar a base.
10. Abaixe o conjunto rotativo até uma armação que seja capaz de suportar seu peso.
11. Desmonte o conjunto rotativo até onde for necessário para inspeção, reparo e reposição de peças.

Remoção (Cont.)

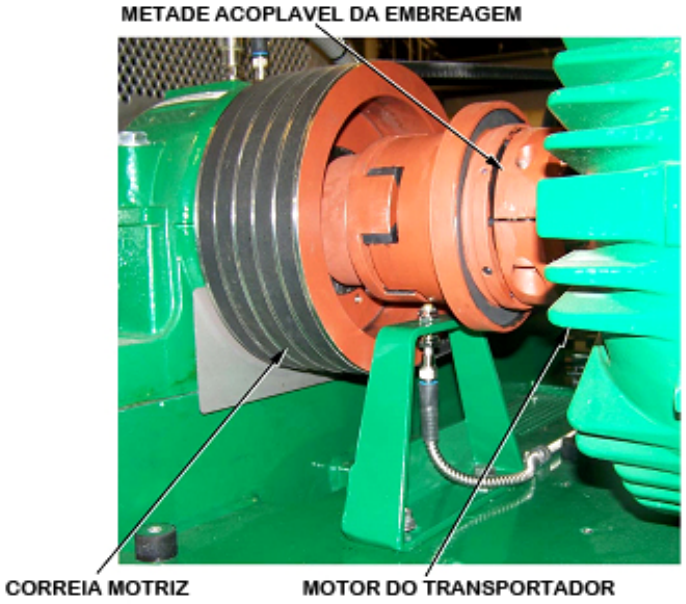


Figura 5-5 Acoplamento Flexível do Transportador

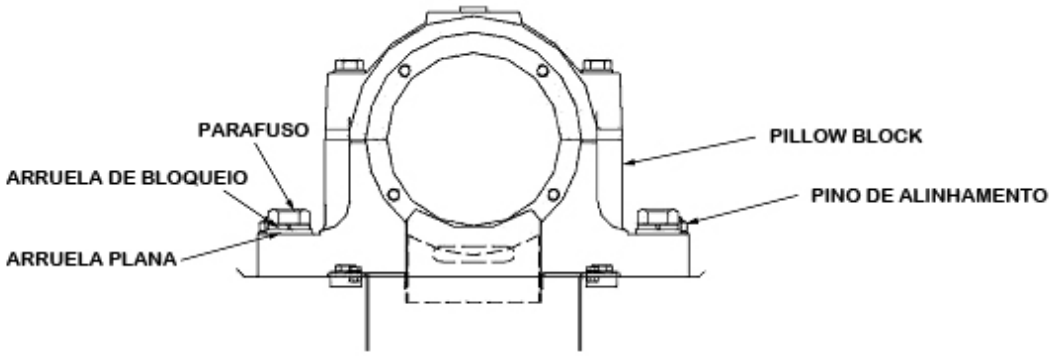


Figura 5-6 Rolamento do Pillow Block

Limpeza, Inspeção e Reparo.

1. Lave a lama e resíduos do transportador e do interior e exterior do conjunto da recipiente e seque com ar comprimido filtrado. Remova qualquer corrosão para facilitar a inspeção.
2. Se o transportador foi removido, inspecione em busca de correias distorçidas ou arrancados, rebarbas ou outros danos visíveis. Uniformize quaisquer menores defeitos de superfície. Substitua o transportador se estiver claramente deformado ou tiver defeitos graves que estejam além de consertos.
3. Inspecione inserções desgastáveis em busca de desgaste evidente. Substituir inserções se estiverem muito danificadas usando o kit G0009149. Para ajudar a preservar o equilíbrio dinâmico, inserções são sempre substituídas em pares que sejam opostos.

4. Inspecione a manga do acionador e o anel em V na extremidade da caixa de engrenagem do transportador em busca de ranhuras, distorção ou sinais evidentes de desgaste. Substitua peça(s) se necessário.
5. Inspecione as inserções desgastáveis e as placas de bloqueio da descarga de sólidos na parede da parte superior do conjunto do recipiente em busca de rachaduras, fraturas ou outros danos e substitua se claramente danificados usando o Kit G0009149.
6. Inspecione o interior e o exterior do recipiente em busca de ranhuras, arranhões ou outros danos que possam afetar o desempenho. Uniformize os defeitos menores; substitua o recipiente se o dano não puder ser reparado.
7. Verifique nos rolamentos principais e nos rolamentos do transportador se há soltura, ruído ou atrito. Substitua todos os rolamentos defeituosos de acordo com os procedimentos de substituição nesta seção.
8. Inspecione os pillow blocks em busca de corrosão, distorção, amassados, rachaduras, rebarbas, fraturas ou outros defeitos. Conserte qualquer defeito menor ou substitua, se graves defeitos ou rachaduras forem encontradas.

Instalação

1. Usando um guincho apropriado capaz de levantar um mínimo de 3500 libras (1600 kg), suspenda o conjunto rotativo da armação e abaixe para a base com pillow blocks em alinhamento estreito com os orifícios de montagem.
2. Utilize um martelo de bronze para assentar completamente os pinos de alinhamento em rolamentos pillow block e base; não aperte as porcas dos pinos de alinhamento.
3. Insira os parafusos de montagem com anilhas através dos orifícios. Aperte os parafusos de acordo com as *Especificações do Torque das Ferragens* nesta seção.
4. Instale e tensione correias motrizes entre o motor e as polias do recipiente de acordo com *Tensão da Correia Motriz* nesta seção.
5. Insira satélite na metade da embreagem da caixa de engrenagem e deslize a metade da embreagem do motor de volta até engatar com a metage da caixa de engrenagem. Defina o espaço livre entre as metades da embreagem em cerca de 0,1875 " a 0,250" (4,8mm para 6,4mm) e aperte os parafusos de montagem na metade da embreagem do motor até 184 libra-pés (250Nm).
6. Instale e prenda proteção de correias sobre o motor e as polias do conjunto do recipiente.
7. Engraxe os rolamentos principais, de acordo com a tabela de lubrificação em *Manutenção Preventiva* e os seguintes passos:
   a. Aplique energia elétrica, inicie a centrífuga e ajuste a velocidade do recipiente para 500RPM.
   b. Enquanto observa a temperatura dos rolamentos, injete graxa nova no pillow block até que os a graxa flua da porta de saída na metade inferior do pillow block ao lado da correia.
8. Feche a tampa da correia e prenda com parafusos apertando do centro da tampa para fora em ambas as direções.
9. Conecte a tubulação de alimentação ao flange do componente de alimentação.
10. Aplique energia elétrica, e inicialize a centrífuga (consulte a Seção 4). Acompanhe atentamente o desempenho e verifique se há algum ruído incomum.

SUBSTITUIÇÃO DO ROLAMENTO PRINCIPAL

As extremidades do conjunto rotativo são apoiadas por rolamentos montados dentro dos pillow blocks. Os rolamentos principais devem ser substituídos como um conjunto. Consequentemente, se um rolamento estiver com defeito, troque sempre os dois rolamentos.

Remoção

O conjunto rotativo deve ser removido para permitir a remoção de rolamentos. Para remover o conjunto rotativo e os rolamentos principais, faça o seguinte:

ATENÇÃO! PARA EVITAR SÉRIAS LESÕES FISICAS CERTIFIQUI-SE DE QUE O EQUIPAMENTO ESTÁ FECHADO, TRANCADO, DESENERGISADO, E TENHA PARADO DE GIRAR ANTES DE EXECUTAR AJUSTES E/OU MANUTENÇÃO.

Remoção

1. Pare a alimentação e desligue, bloqueie (LO) e etiquete (TO) energia elétrica para a centrífuga. Permita ao conjunto rotativo parar completamente.
2. Retire os parafusos que prendem a correia de segurança à base, e levante e remova o protetor.
3. Remova os parafusos que prendem a tampa do invólucro ao invólucro, e abra a tampa.
4. Usando uma mangueira de água, lave resíduos do processo de dentro do invólucro e fora do conjunto rotativo.
5. Folgue os parafusos de montagem e os parafusos de fixação que prendem metade da embreagem de limitação de torque ao eixo do motor de acionamento do transportador, deslize a metade da embreagem na direção do motor até que a extremidade do eixo do motor esteja visível e então remova o satélite.
6. Desconecte a tubulação de alimentação do flange do componente de alimentação.
7. Solte as porcas que prendem o motor de acionamento do recipiente à base, vire o parafuso de tensão para liberar a tensão, e remova a correia da polia do recipiente.
8. Remova a tampa da caixa de conexão de aço inoxidável na base da centrífuga (Figura 5-7) e desligue os sensores de temperatura das extremidades de líquidos e sólidos do bloco de terminais.
9. Desparafuse a porca de acoplamento do cotovelo nos sensores de temperatura das extremidades de líquidos e sólidos (Figura 5-8) e puxe os fios elétricos por meio do conduíte. Bobine e prenda os fios para evitar interferência durante a remoção do conjunto rotativo.
10. Desconecte o cabo do sensor de velocidade do sensor de velocidade.
11. Remova os pinos de alinhamento, parafusos, arruelas de travamento arruelas lisas que prendem o pillow block à base nas extremidades de líquidos e sólidos (Figura 5-9).
12. Conecte um guindaste capaz de levantar pelo menos 4000 libras (1800 kg) ao conjunto rotativo.
13. Equilíbre adequadamente as correias de elevação para garantir que o conjunto permaneça na horizontal durante o levantamento e lentamente suspenda o conjunto rotativo até deixar a base.

14. Abaixe o conjunto rotativo até uma armação que seja capaz de suportar seu peso.
15. Enquanto apoia a metade inferior do pillow block, remova parafusos que prendem as metades superior e inferior. Force entre as partes para separar e remover as metades do pillow block.
16. Folgue os parafusos de montagem que prendem a metade da embreagem ao eixo da caixa de engrenagem e remova a metade da embreagem.
17. Remova os parafusos que prendem a polia ao flange do recipiente e remova a polia.
18. Remova os parafusos que prendem o flange de entrada ao alojamento da caixa de engrenagem e levante e remova o flange. Remova o anel em O do flange de entrada e descarte o anel em O.
19. Folgue o parafuso de fixação que prendem a carcaça (Figura 5-10) ao eixo da caixa de engrenagem do acionador do transportador e retire a carcaça, ajustador de graxa e anel espaçador do eixo da caixa de engrenagem.
20. Usando um extrator apropriado, remova o rolamento da extremidade de sólidos do eixo da caixa de engrenagem.
21. Remova os parafusos que prendem o anel de fixação (Figura 5-11) à parte superior do recipiente de líquidos, folgue os parafusos de fixação que prendem o anel de segurança e remova o anel de fixação.
22. Remova o anel de feltro, retentor tipo gaxeta, anel em O e arruela de retenção da parte superior do recipiente.

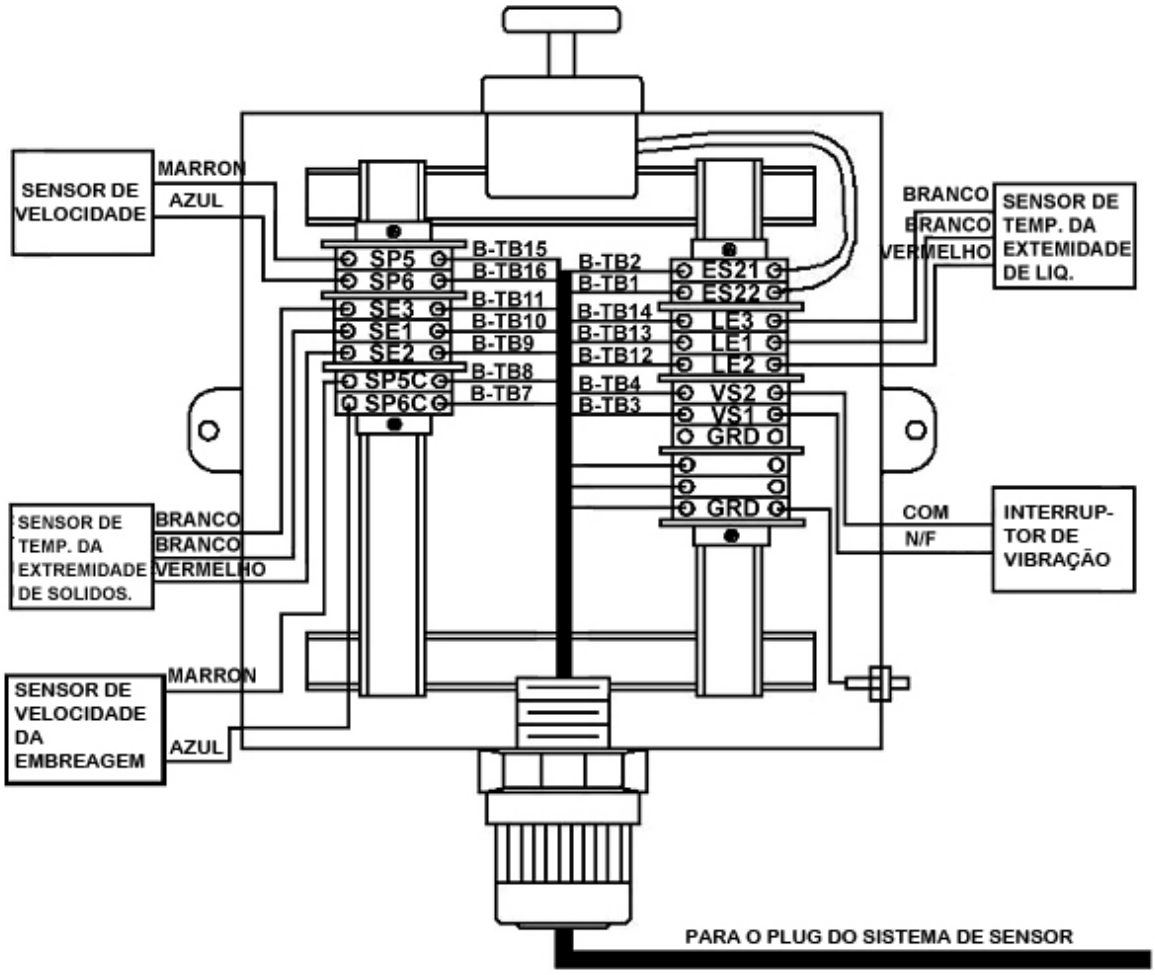


Figura 5-7 Conexões da Caixa de Conexões do Sistema de Sensores

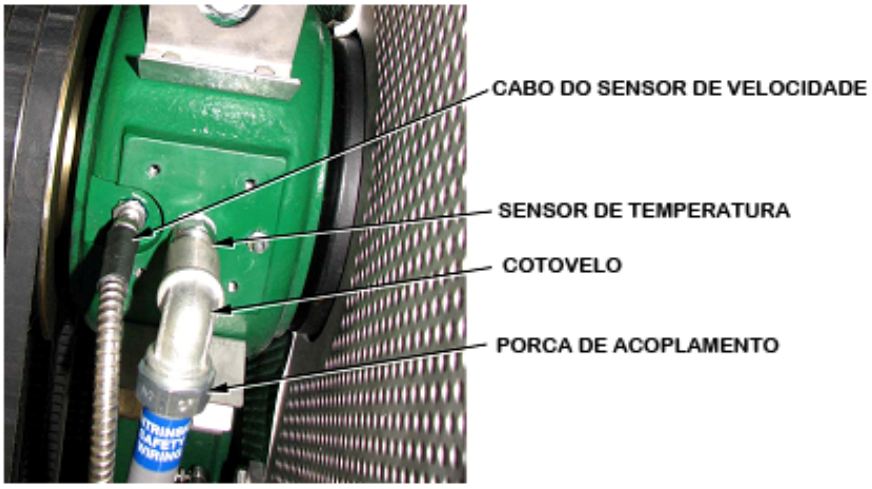


Figura 5-8 Sensores de Temperatura e Velocidade da Extremidade de Sólidos

Remoção (Cont.)

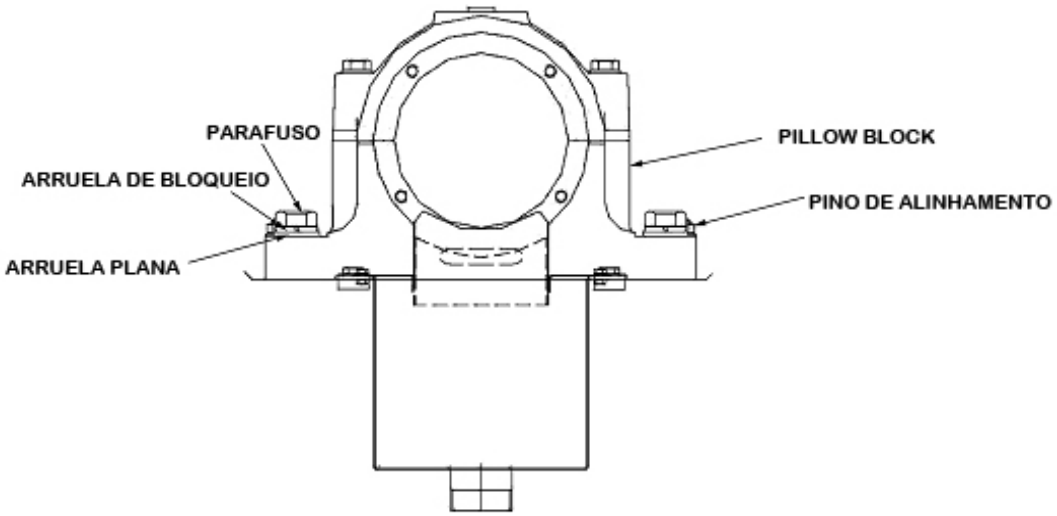


Figura 5-9 Metade Superior do Rolamento Pillow Block da Extremidade de Líquidos

23. Usando um extrator apropriado, remova o rolamento da extremidade de líquidos do eixo da parte superior do recipiente.
24. Remova o defletor e o anel em O do eixo.

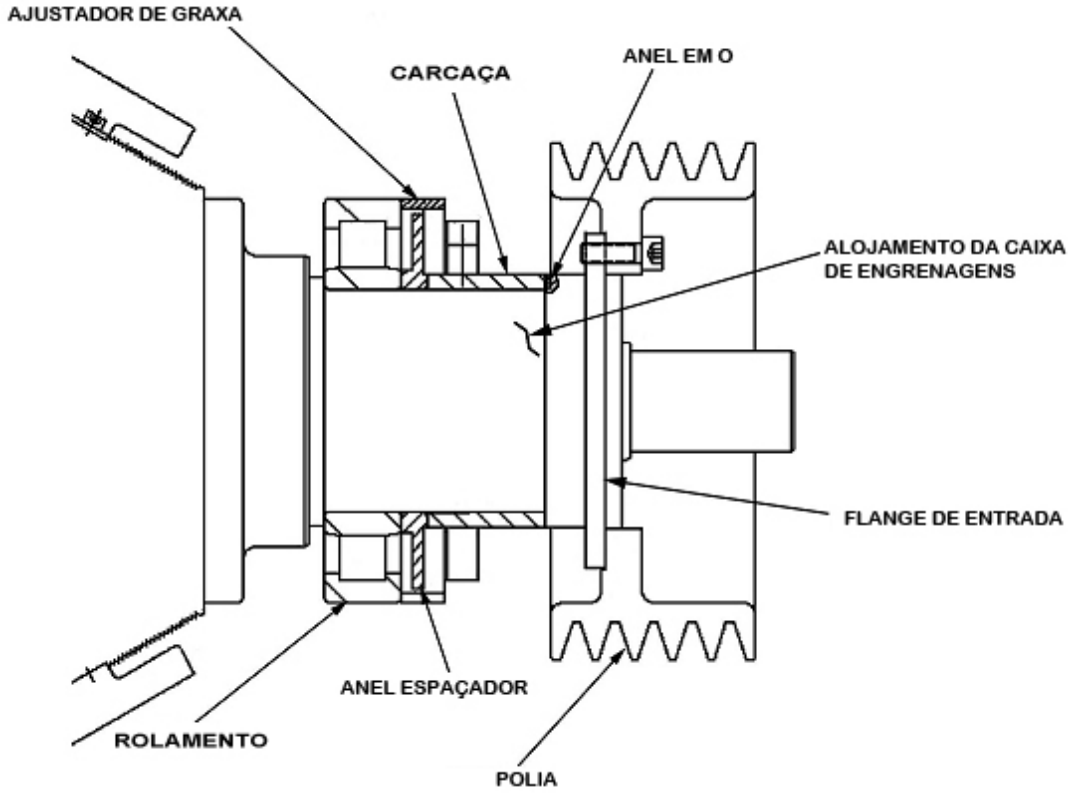


Figura 5-10 Detalhe do Rolamento da Extremidade de Sólidos

Remoção (Cont.)

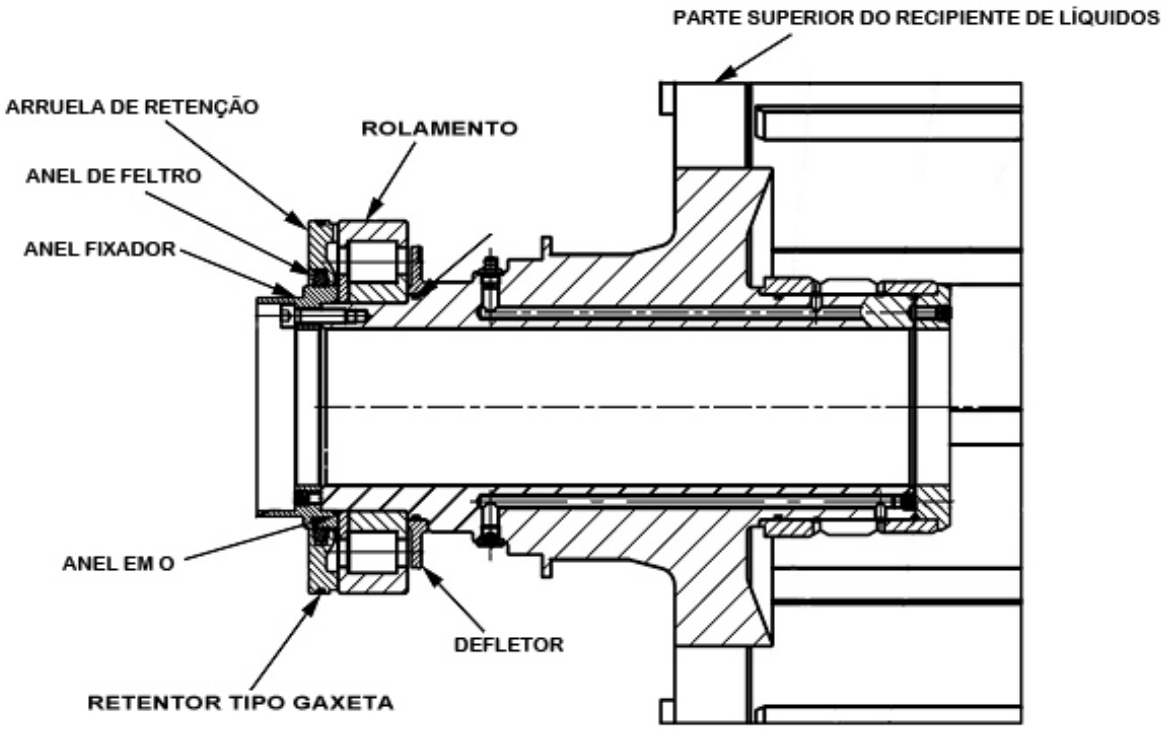


Figura 5-11 Detalhe do Rolamento da Extremidade de Líquidos

Limpeza, Inspeção e Reparo.

1. Limpe todos os componentes com um limpador adequado / desengraxante, e seque com ar comprimido filtrado. Remova qualquer corrosão para facilitar a inspeção.
2. Inspecione todas as partes em busca de arranhões, amassados, rebarbas ou deformações que possam afetar aptidão para retornar ao serviço. Uniformize quaisquer menores defeitos de superfície. Substitua os componentes que estão claramente deformados ou têm falhas graves que impossibilitam reparos.
3. Usando um micrômetro, meça as dimensões críticas da parte superior do recipiente de líquidos e rolamentos de rolete do acionador do transportador. Se o mancal da extremidade de líquidos estiver subdimensionadas, substitua a parte superior do recipiente de líquidos. Substitua a caixa de engrenagens do acionador do transportador se o mancal da extremidade de sólidos estiver subdimensionado.
4. Inspecione os pillow blocks em busca de corrosão, distorção, amassados, rachaduras, rebarbas, fraturas ou outros defeitos. Conserte qualquer defeito menor ou substitua, se graves defeitos ou rachaduras forem encontradas.
5. Substitua qualquer componente que não possa ser facilmente reparado.
6. Substitua todos os O-rings, vedações e rolamentos.
7. Coloque todos os componentes limpos em sacos plásticos para evitar contaminação.

Instalação

1. Instale o rolamento principal da extremidade de sólidos da seguinte forma:
   a. Usando um aquecedor de rolamentos ou banho de óleo quente, aqueça a pista interna do rolamento principal até cerca de 230 ° F (110 ° C). Usando luvas protetoras, deslize a pista até o mancal.
   b. Aplique graxa ao rolamento de acordo com a Figura 5-1, e instale o rolamento na pista interna (Figura 5-10).
   c. Oriente o anel espaçador com um passo maior em direção ao rolamento (Figura 5-12) e instale o anel espaçador e ajustador de graxa no eixo da caixa de engrenagem.
   d. Deslize a carcaça e o came do sensor de velocidade no eixo da caixa de engrenagem. Defina o came do sensor de velocidade como 1-1/4" da extremidade da carcaça como mostrado e aperte os parafusos de ajuste para prender a came.
   e. Instale o anel em O no flange de entrada (Figura 5-10) e posicione o flange de entrada sobre o alojamento da caixa de engrenagem. Intale e aperte os parafusos de acordo com as *Especificações do Torque das Ferragens* nesta seção, para prender o flange.
   f. Deslize a polia no eixo e contra o flange de entrada. Fixe a polia ao flange de entrada com parafusos apertados com o torque especificado em *Especificações do Torque das Ferragens* nesta seção.
   g. Deslize a metade fixa da metade da embreagem no eixo da caixa de engrenagem, mas deixe os parafusos de montagem soltos.
2. Instale o rolamento principal da extremidade de líquidos e reinstale o conjunto rotativo da seguinte forma:
   a. Instale o anel em O (Figura 5-11) e defletor no mancal da parte superior do recipiente de líquidos.
   b. Aplique graxa ao rolamento de acordo com a Figura 5-1, e instale o rolamento de assentamento no eixo da parte superior do recipiente de líquidos (Figura 5-10).
   c. Instale a arruela de retenção, o anel em O, o retentor tipo gaxeta e o anel de feltro no eixo da parte superior do recipiente de líquidos.
   d. Instale o anel de fixação parte superior do recipiente de líquidos e prenda com parafusos. Aperte os parafusos de ajuste do anel de fixação com torque especificado em *Especificações do Torque das Ferragens* nesta seção.
3. Monte as metades superior e inferior do pillow block em cada rolamento principal e prenda com parafusos apertando progressivamente até atingir o torque especificado em *Especificações do Torque das Ferragens* nesta seção.
4. Opere o guincho para suspender o conjunto rotativo da armação e abaixe para a centrífuga até que os pillow blocks entrem em contato com a base.
5. Usando um martelo de bronze, assente completamente os pinos de alinhamento nos rolamentos pillow block e na base; então insira parafusos de montagem e arruelas de travamento através dos orifícios. Aperte os parafusos progressivamente até atingir o torque especificado em *Especificações do Torque das Ferragens* nesta seção. Não aperte as porcas dos pinos de alinhamento.

6. Instale correias motrizes no motor e nas polias do recipiente e correias de tensão de acordo com *Tensão da Correia Motriz* nesta seção.
7. Insira um satélite na metade da embreagem da caixa de engrenagem e posicione a metade da embreagem da caixa de engrenagem de forma que a superfície traseira se alinhe com face frontal da polia (Figura 5-12).
8. Deslize a metade da embreagem do eixo do motor ao engate com a metade da caixa de engrenagem, defina a folga entre as metades da embreagem em cerca de 0,1875" à 0.250" (4.8 mm à 6.4 mm) e, em seguida, posicione a embreagem axialmente para que o ponto médio do satélite esteja alinhado com o sensor de proximidade.

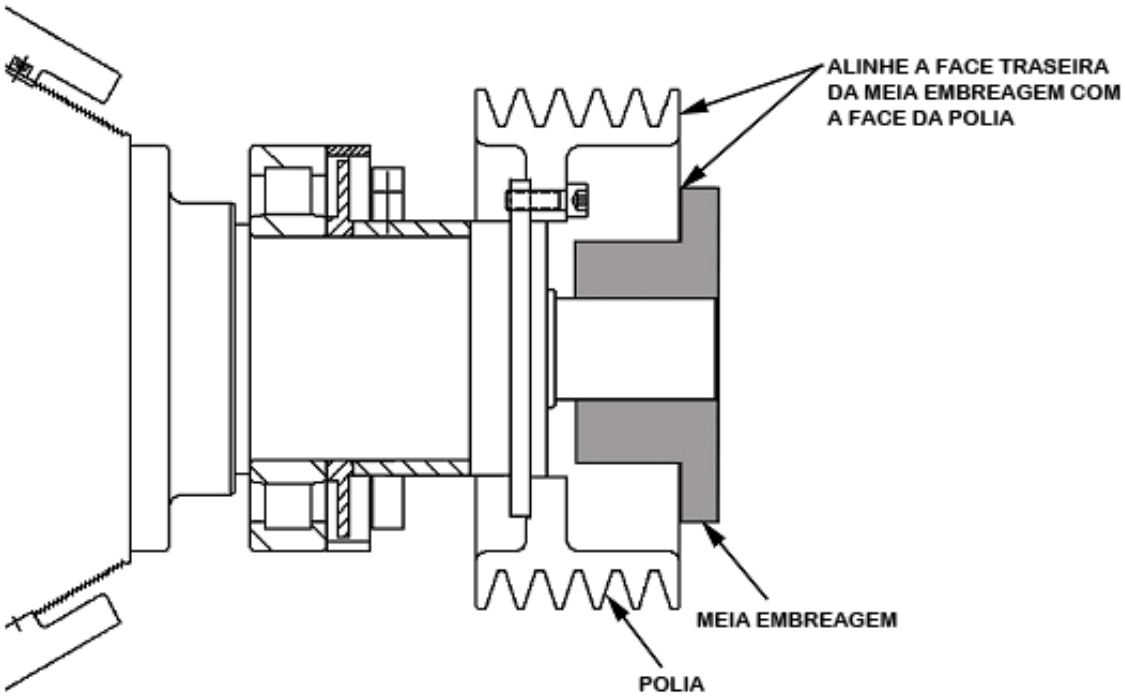


Figura 5-12 Instalação de Polia e Embreagem no Eixo da Caixa de Engrenagem

9. Gire a embreagem do eixo do motor até o parafuso de ajuste está alinhado com a chave do eixo, e aperte o parafuso de ajuste. Aperte os parafusos de montagem em ambas as metades de embreagem em 184 libra-pé (250 Nm).
10. Desenrole e reconecte os fios do sensor de temperatura ao bloco do terminal na caixa de conexões (Figura 5-7), e então reinstale a tampa da caixa de conexões.
11. Conecte o cabo do sensor de velocidade ao interruptor do sensor de proximidade.
12. Instale a proteção da correia nas polias do motor e do conjunto do recipiente e prenda à base com parafusos.
13. Engraxe os rolamentos principais, de acordo com a Figura 5-1 e siga os seguintes passos:
    a. Aplique energia elétrica, ligue a centrífuga e ajuste a velocidade do recipiente para 500 rpm.
    b. Enquanto observa a temperatura dos rolamentos, injete graxa nova no pillow block até que os a graxa flua da porta de saída na metade inferior do pillow block ao lado da correia.

14. Desligue a centrífuga.
15. Após a parada do conjunto rotativo, feche a tampa do invólucro e prenda com parafusos apertando do centro da tampa para fora em ambas as direções.
16. Conecte a tubulação de alimentação ao flange do componente de alimentação.
17. Aplique energia elétrica, e inicialize a centrífuga (consulte a Seção 4). Acompanhe atentamente o desempenho e verifique se há algum ruído incomum.

SUBSTITUIÇÃO DO ROLAMENTO DO TRANSPORTADOR CONTÍNUO

Este procedimento descreve a substituição do rolamento do transportador. Este procedimento exige a remoção do conjunto do transportador do conjunto do recipiente. Vibração ou ruído excessivo durante o funcionamento da centrifuga pode indicar um rolamento defeituoso. Se essas condições são evidentes, o transportador deve ser removido e o rolamento inspecionado a procura de folgas e substituído se necessário.

Remoção

A extremidade de líquidos do transportador é apoiada por um rolamento de esferas montado dentro de um alojamento no transportador. A extremidade de sólidos é apoiada pelo rolamento da caixa de engrenagem do acionador do transportador. Se o rolamento da extremidade de líquido apresentar defeito, não se esqueça de verificar se há frouxidão no eixo da caixa de engrenagem. O rolamento do eixo da caixa de engrenagem também deve ser substituído se frouxidão do eixo for encontrada.

Para remover os rolamentos do transportador, faça o seguinte:

ATENÇÃO! PARA EVITAR SÉRIAS LESÕES FISICAS CERTIFIQUI-SE DE QUE O EQUIPAMENTO ESTÁ FECHADO, TRANCADO, DESENERGISADO, E TENHA PARADO DE GIRAR ANTES DE EXECUTAR AJUSTES E/OU MANUTENÇÃO.

1. Desligue, bloqueie (LO) e etiquete (TO) energia elétrica para a centrífuga. Permita ao conjunto rotativo parar completamente.
2. Desconecte a tubulação de alimentação do componente de alimentação.
3. Retire os parafusos que prendem a correia de segurança à base, e levante e remova o protetor.
4. Remova os parafusos que prendem a tampa do invólucro ao invólucro, e abra a tampa.
5. Remova a caixa de engrenagens do acionador do transportador em conformidade com os procedimentos de remoção da caixa de engrenagem nesta seção.
6. Suspenda a extremidade de líquidos do conjunto rotativo até que o conjunto rotativo esteja na posição vertical (Figura 5-13) e em seguida coloque a extremidade sólida sobre uma superfície estável e plana. Mantenha um apoio adequado do conjunto rotativo na posição vertical em todo restante do procedimento de remoção do transportador.
7. Remova os parafusos que prendem a parte superior do recipiente de líquidos do conjunto do recipiente e instale parafusos em quatro locais em torno da periferia da parte superior do recipiente.

8. Conecte um guincho apropriado à parte superior do recipiente de líquidos e gire os parafusos no sentido horário em estágios uniformemente para separar a parte superior do recipiente do conjunto do recipiente e opere o guincho para suspender e remover a parte superior do recipiente do conjunto do recipiente.

CUIDADO! O ESPAÇO LIVRE ENTRE AS PISTAS DO TRANSPORTADOR E O REVESTIMENTO DO RECIPIENTE É DE APENAS 1,5 MM. NA ETAPA SEGUINTE, NÃO CONTINUE A SUSPENDER SE RESISTÊNCIA FOR SENTIDA, ASSIM PODE HAVER DANO ÀS PISTAS DO TRANSPORTADOR.

9. Conecte um guincho apropriado ao transportador e, lentamente, levante o transportador para longe do conjunto do recipiente.
10. Abaixe o transportador horizontalmente sobre uma armação adequada para suportar o seu peso.
11. Remova os parafusos (Figura 5-14) que prendem o alojamento do rolamento ao transportador e instale dois parafusos em lados opostos do alojamento. Aperte os parafusos igualmente para extrair e remover o alojamento do rolamento.

Figura 5-13 Removendo o Transportador do Conjunto do Recipiente

12. Remova os parafusos que prendem a tampa do retentor ao alojamento do rolamento e abra o retentor do eixo.
13. Usando um extrator apropriado, remova o rolamento do alojamento de rolamento e, em seguida, retire o segundo retentor do eixo do alojamento.
14. Descarte os rolamentos e retentores do eixo.

Limpeza, Inspeção e Reparo.

1. Limpe todos os componentes com um limpador adequado / desengraxante, e seque com ar comprimido filtrado. Remova qualquer corrosão para facilitar a inspeção.
2. Inspecione todas as partes em busca de arranhões, amassados, rebarbas ou deformações que possam afetar aptidão para retornar ao serviço. Uniformize quaisquer menores defeitos de superfície. Substitua os componentes que estão claramente deformados ou têm falhas graves que impossibilitam reparos.
3. Inspecione o transportador em busca de correias distorcidas ou arrancadas, rebarbas ou outros danos visíveis. Uniformize quaisquer menores defeitos de superfície. Substitua o transportador se estiver claramente deformado ou tiver defeitos graves que estejam além de consertos.

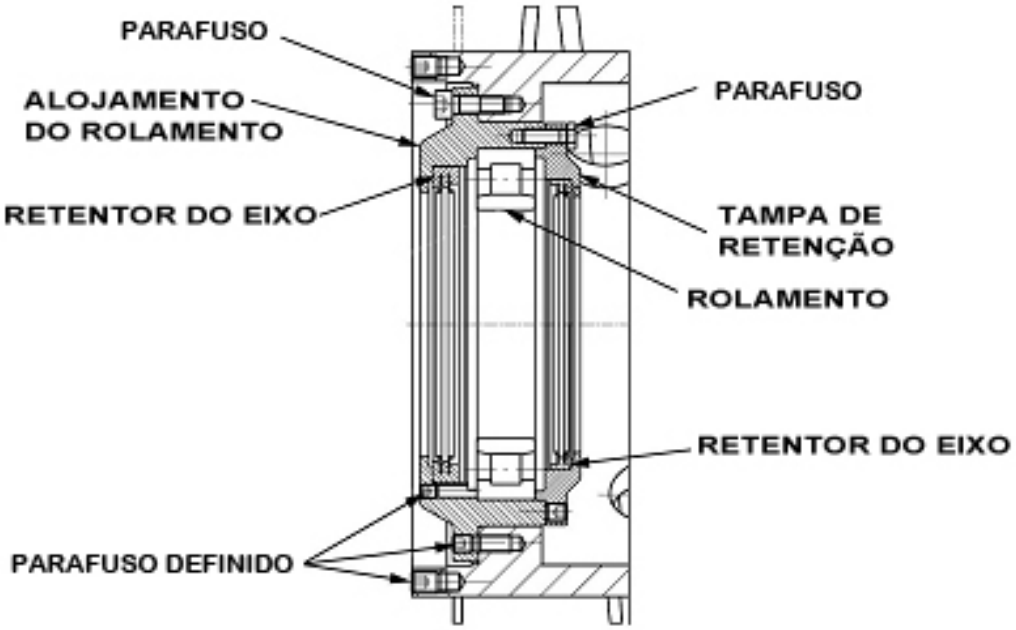


Figura 5-14 Detalhe do Rolamento do Transportador

8. Inspecione as inserções desgastáveis do transportador em busca de desgaste evidente. Substitua as inserções se estiverem muito danificados. Para ajudar a preservar o equilíbrio dinâmico, sempre substitua as inserções em pares que sejam opostos.
9. Inspecione as inserções desgastáveis e as placas de bloqueio da descarga de sólidos na parte superior do recipiente de líquidos em busca de rachaduras, fraturas ou outros danos e substitua se claramente danificados.
10. Inspecione a manga do acionador e o anel em V na extremidade da caixa de engrenagem do transportador em busca de ranhuras, distorção ou sinais evidentes de desgaste. Substitua peça(s) se necessário.
11. Usando um micrômetro, meça as dimensões críticas do rolamento do rolamento do transportador da parte superior do recipiente de líquidos e do furo do alojamento de rolamentos. Se o mancal da extremidade de líquidos estiver subdimensionadas, substitua a

parte superior do recipiente de líquidos. Substitua o alojamento de rolamento se o buraco estiver folgado.

12. Substitua qualquer componente que não possa ser facilmente reparado. Substitua todos os retentores de eixo e rolamentos.
13. Coloque todos os componentes limpos em sacos plásticos para evitar contaminação.

Instalação

Este procedimento descreve a instalação do rolamento do transportador da extremidade de líquidos. Se o rolamento de caixa de engrenagem estiver folgado, a caixa de engrenagem deve ser substituída ou reconstruída também (consulte *Manutenção da Caixa de Engrenagem* nesta seção).

Para instalar o rolamento da extremidade de líquidos, faça o seguinte:

1. Instale um novo retentor do eixo no alojamento do rolamento (Figura 5-14) e, em seguida, insira e assente o rolamento no alojamento.
2. Instale um novo retentor do eixo na tampa de retentor e monte a tampa no alojamento do rolamento. Prenda as peças com parafusos hexagonais.
3. Instale o alojamento de rolamento montado no transportador e prenda com parafusos.

CUIDADO! O ESPAÇO LIVRE ENTRE AS PISTAS DO TRANSPORTADOR E O REVESTIMENTO DO RECIPIENTE É DE APENAS 1,5 MM. NA ETAPA SEGUINTE, TENHA MUITO CUIDADO QUANDO ABAIXAR O TRANSPORTADOR ATÉ O CONJUNTO DO RECIPIENTE PARA EVITAR ENCOSTA-LO NO REVESTIMENTO DO RECIPIENTE POIS ASSIM PODE HAVER DANO ÀS CORREIAS DO TRANSPORTADOR.

4. Suspenda o transportador em uma posição vertical (Figura 5-13), e insira no conjunto do recipiente vertical.
5. Suspenda a parte superior do recipiente de líquidos e abaixe até o transportador tomando cuidado para evitar danificar o rolamento visto que o rolamento do rolamento do transportador entra na pista interna do rolamento. Prenda o a parte superior do recipiente de líquidos ao conjunto do recipiente com parafusos.
6. Suspenda o conjunto rotativo montado e posicione horizontalmente em uma armação adequado para suportar o seu peso.
7. Instale e preecha a caixa de engrenagens em conformidade com os procedimentos de instalação da caixa de engrenagem em *Manutenção da Caixa de Engrenagem*nesta seção.
8. Feche a tampa da correia e prenda com parafusos apertando do centro da tampa para fora em ambas as direções.
9. Instale e prenda proteção de correias sobre o motor e as polias do conjunto do recipiente.
10. Conecte a tubulação de alimentação ao flange do componente de alimentação.
11. Aplique energia elétrica, e inicialize a centrífuga (consulte a Seção 4). Acompanhe atentamente o desempenho e verifique se há algum ruído incomum.

REMOÇÃO E INSTALAÇÃO DA CAIXA DE EMBREAGEM

Este procedimento deve ser realizado por pessoal devidamente treinado e qualificado. Para evitar a contaminação dos rolamentos e componentes internos da centrífuga, este procedimento deve ser realizado em um ambiente limpo.

Remoção

O conjunto rotativo deve ser removido para uma limpeza completa, inspeção e manutenção. Para remover o conjunto rotativo, faça o seguinte:

ATENÇÃO! PARA EVITAR SÉRIAS LESÕES FISICAS CERTIFIQUI-SE DE QUE O EQUIPAMENTO ESTÁ FECHADO, TRANCADO, DESENERGISADO, E TENHA PARADO DE GIRAR ANTES DE EXECUTAR AJUSTES E/OU MANUTENÇÃO.

1. Desligue a alimentação e desative, bloqueie e etiquete (LOTO) a energia elétrica para a centrífuga. Permita ao conjunto rotativo parar completamente.
2. Retire os parafusos que prendem a correia de segurança à base, e levante e remova o protetor.
3. Remove screws securing case cover to base, and open case cover.
4. Usando uma mangueira de água, lave resíduos do processo de dentro do invólucro e fora do conjunto rotativo.
5. Folgue os parafusos que prendem metade da embreagem de limitação de torque ao eixo do motor de acionamento do transportador, deslize a metade da embreagem na direção do motor até que a extremidade do eixo do motor esteja visível e então remova o satélite.
6. Desconecte a tubulação de alimentação do componente de alimentação.
7. Solte as porcas que prendem a placa de montagem do motor de acionamento do recipiente à base da centrífuga, vire o parafuso de tensão para liberar a tensão, e remova a correia da polia do recipiente.
8. Remova os pinos de alinhamento, parafusos, arruelas de travamento arruelas lisas que prendem o pillow block à base nas extremidades de líquidos e sólidos (Figura 5-15).

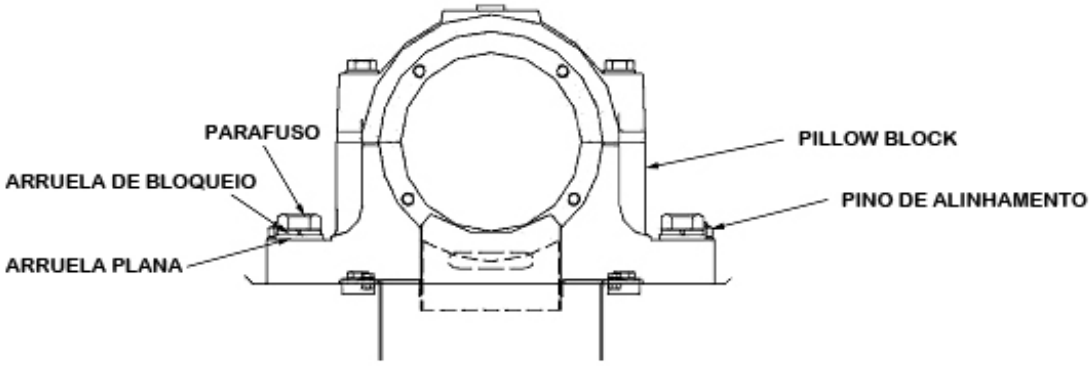


Figura 5-15 Conexão do Rolamento do Pillow Block

9. Remova a tampa da caixa de conexão de aço inoxidável na base da centrífuga (Figura 5-16) e desligue os sensores de temperatura das extremidades de sólidos e líquidos do bloco de terminais.
10. Desparafuse a porca de acoplamento do cotovelo nos sensores (Figura 5-17) e puxe os fios elétricos por meio do conduíte. Bobine e prenda os fios para evitar interferência durante a remoção do conjunto rotativo.
11. Desconecte o cabo do sensor de velocidade do sensor de velocidade.
12. Conecte um guindaste capaz de levantar pelo menos 4000 libras (1800 kg) ao conjunto rotativo.
13. Equilíbre adequadamente as correias de elevação para garantir que o conjunto permaneça na horizontal durante o levantamento e lentamente suspenda o conjunto rotativo até deixar a base.
14. Abaixe o conjunto rotativo até uma armação que seja capaz de suportar seu peso.
15. Remova os parafusos que prendem as metades superior e inferior do pillow block da extremidade de sólidos. Apóie a metade de baixo enquanto força abrir as duas metades e separe e retire as metades do pillow block do rolamento principal.
16. Marque a localização da metade da embreagem no eixo da caixa de engrenagem e folgue os parafusos de montagem que prendem a metade da embreagem ao eixo da caixa de engrenagem e remova a metade da embreagem.
17. Remova os parafusos que prendem a polia ao flange de entrada e remova a polia.
18. Remova os parafusos que prendem o flange de entrada ao alojamento da caixa de engrenagem (Figura 5-18) e levante e remova o flange.

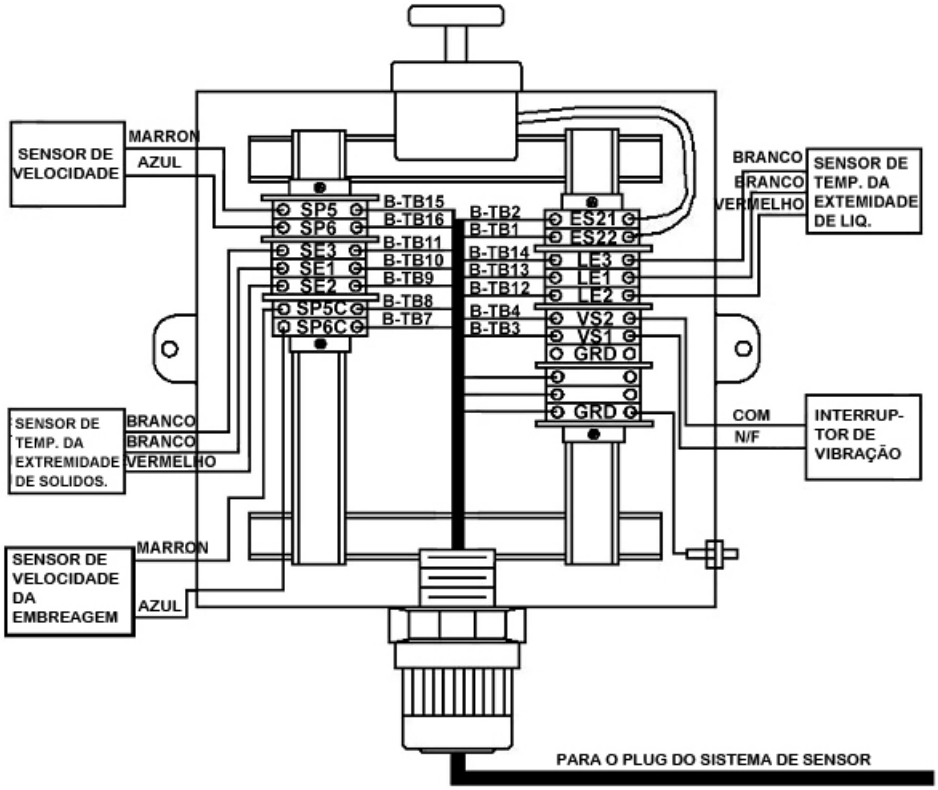


Figura 5-16 Conexões de Sensores de Temperatura

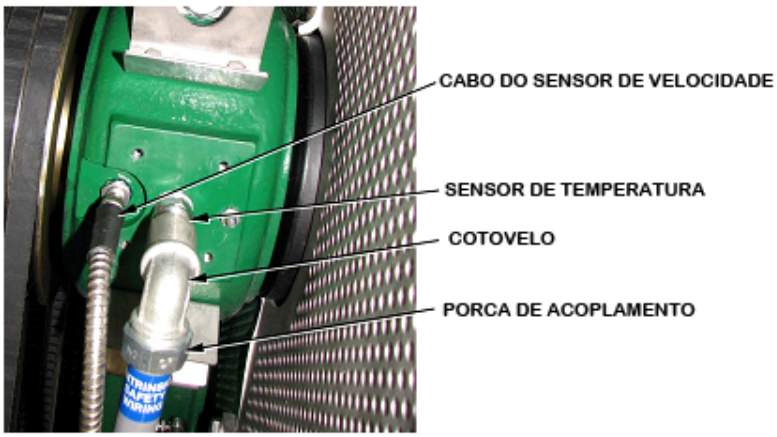


Figura 5-17 Sensores de Temperatura e Velocidade - Extremidade de Sólidos

Remoção (Cont.)

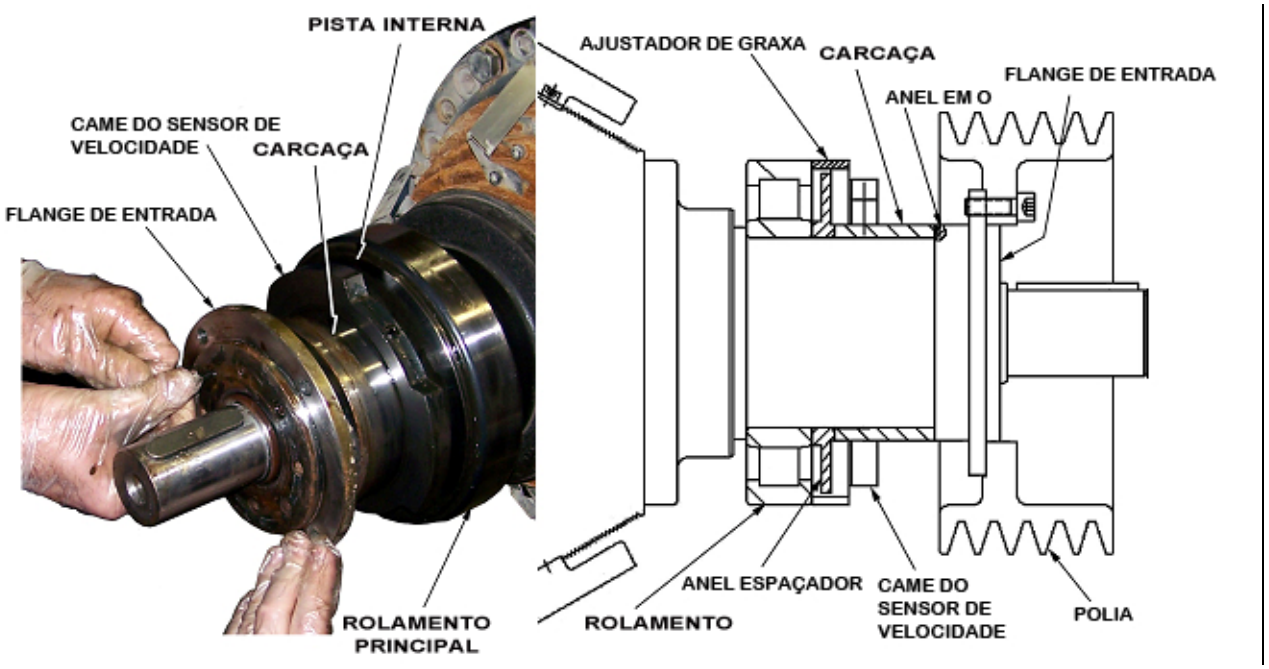


Figura 5-18 Flange de Entrada, Came de Sensor de Velocidade, Rolamento Principal da Extremidade de Sólidos.

19. Observe a orientação das peças no eixo da caixa de engrenagem e remova a carcaça (com a came do sensor de velocidade conectada), regulador de graxa e anel espaçador do eixo.
20. Trabalhando através de duas portas efluentes na extremidade de líquidos, remova dois parafusos M12 a 180 ° de distancia do transportador. Instale duas placas nas portas (Figura 5-19), insira um parafuso longo M12 através de cada prato e aperte levemente os parafusos. Essas placas irão manter o transportador no local, enquanto a caixa de engrenagem é extraída do conjunto do recipiente.
21. Retire dois plugues tubo do transportador (Figura 5-20) e desenrosque o pino guia que prendem o eixo da caixa de engrenagem ao transportador.
22. Remova 20 parafusos de cabeça oca M16 que prendem a caixa de engrenagem ao conjunto do recipiente (Figura 5-21).
23. Remova quatro parafusos de cabeça sextavada M16 do alojamento e lubrifique e instale parafusos jack em dois dos orifícios enroscados a 180 graus de separação.
24. Conecte um guincho apropriado capaz de levantar pelo menos 550 libras (250 kg) para apoiar a caixa de engrenagem quando ela for levantada para fora do conjunto do recipiente.
25. Alternadamente gire cada parafuso jack instalado na etapa 23, acima, para tirar lentamente a caixa de engrenagem até estar totalmente fora do conjunto do recipiente.

Remoção (Cont.)

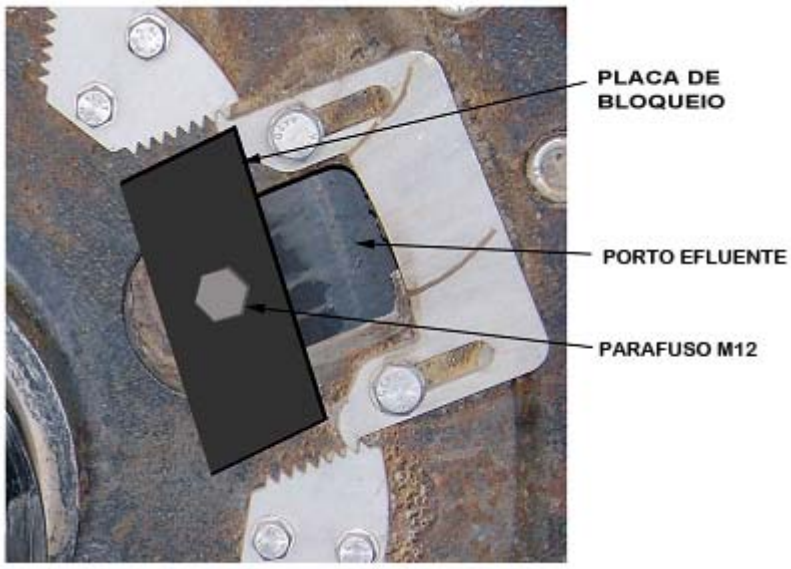


Figura 5-19 Instalando a Placa de Retenção do Transportador

Figura 5-20 Remoção do Pino Guia quem Prende o Eixo da Caixa de Engrenagens ao Transportador

Figura 5-21 Remoção da Caixa de Engrenagem

Instalação

Para instalar a caixa de engrenagem, faça o seguinte:

1. Usando um guincho adequado, apóie a caixa de engrenagem substituta em um nível horizontal, como feito anteriormente em *Remoção.* Bata levemente e limpe todos os orifícios na caixa de engrenagem. Remover os revestimentos de proteção de todas as superfícies de contato da caixa de engrenagem.
2. Instale um novo anel em O na caixa de engrenagem (Figura 5-22) e lubrifiqueo anel em O e o eixo com uma leve camada de composto antiengripante.
3. Retire os parafusos M12 que prendem as duas placas que foram temporariamente instaladas para conter o transportador durante a remoção da caixa de engrenagem e remova as placas. Aplique Loctite nos parafusos M12 previamente removido do transportador e reinstale os parafusos.
4. Gire o eixo da caixa de engrenagem até que a chave esteja alinhada com o entalhe no transportador.
5. Instale as porcas e arruelas estreitas em dois parafusos jack e introduza os parafusos através dos orifícios limpos no flange da caixa de engrenagem a 180 graus de separação. Enrosque os parafusos nos orifícios de montagem do conjunto da caixa de engrenagem no conjunto do recipiente.
6. Alternadamente gire cada parafuso algumas voltas por vez para gradual e uniformemente juntar a caixa de engrenagem ao conjunto do recipiente.
7. Quando a caixa de engrenagem estiver totalmente encaixada no recipiente, remova os parafusos jack e instale 20 parafusos de cabeça oca M16 para prender a caixa de

engrenagem. Aperte os parafusos até o toque determinado de acordo com as *Especificações do Torque das Ferragens* nesta seção.

8. Instale quatro parafusos de cabeça sextavada M16 através dos orifícios limpos na caixa de engrenagem e nos orifícios correspondentes no recipiente e aperte de acordo com *Especificações do Torque das Ferragens* nesta seção.
9. Insira uma alavanca no buraco do pino guia no eixo da caixa de engrenagem e, cuidadosamente, alinhe o orifício para facilitar a inserção do pino guia.
10. Aplique um composto antiengripante no pino guia e nos plugues do tubo. Insira o pino através do transportador e do eixo da caixa de engrenagem e instale plugues de tubo em furos enroscados no transportador para reter o pino.

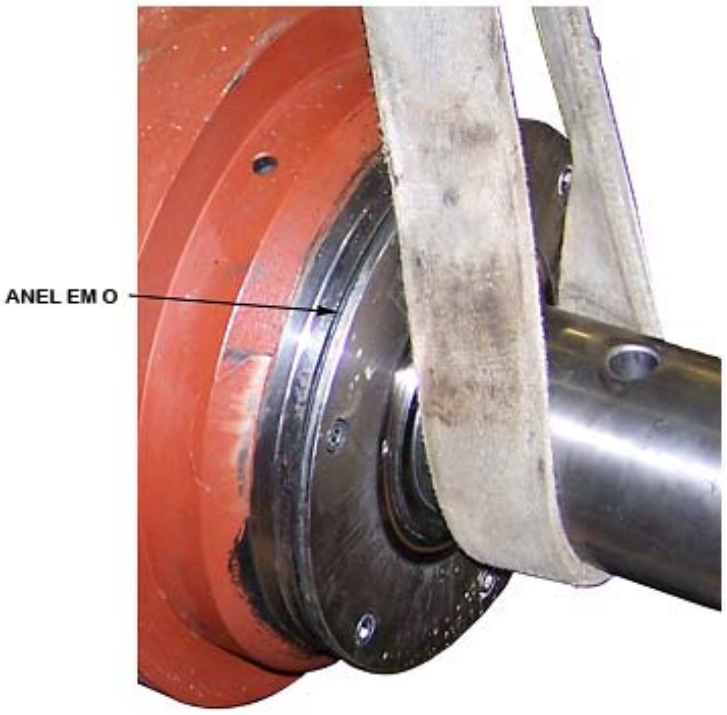


Figura 5-22 Localização do Anel em O da Caixa de Engrenagem

ATENÇÃO! NO PASSO A SEGUIR, USE UM AQUECEDOR DE ROLAMENTO OU UM BANHO DE ÓLEO LIMPO AQUECIDO PARA AQUECER A PISTA INTERNA DO ROLAMENTO. NÃO USE UM MAÇARICO, POIS ASSIM DANIFICARÁ O ROLAMENTO.

11. A pista interna do rolamento principal está instalada no eixo da caixa de engrenagem na fábrica. No entanto, se a caixa de engrenagem retirada está sendo reinstalada, será necessário instalar uma nova pista interna da seguinte forma:
    a. Usando um aquecedor de rolamentos ou banho de óleo quente, aqueça a pista interna do rolamento principal até cerca de 230 ° F (110 ° C).
    b. Usando luvas protetoras, deslize a pista interna até o mancal.
    c. Espere que a pista esfrie antes de prosseguir com a instalação do rolamento principal.

12. Aplique graxo no rolamento de acordo com a tabela de lubrificação na Figura 5-1 e instale na pista interna.
13. Oriente o anel espaçador com um passo maior em direção ao rolamento (Figura 5-23) e instale o anel espaçador e ajustador de graxa no eixo da caixa de engrenagem.
14. Deslize a carcaça e o came do sensor de velocidade no eixo da caixa de engrenagem. Defina o came do sensor de velocidade como 1-1/4" da extremidade da carcaça como mostrado e aperte os parafusos de ajuste para prender a came.
15. Instale o anel em O no flange de entrada e posicione o flange de entrada no alojamento da caixa de engrenagem. Instale e aperte os parafusos de acordo com as *Especificações do Torque das Ferragens* nesta seção.
16. Coloque as metades superior e inferior do pillow block sobre o rolamento principal e instale e aperte os parafusos de acordo com *Especificações do Torque das Ferragens* nesta seção.
17. Deslize a polia no eixo contra o flange de entreada e instale e aperte os parafusos de acordo com *Especificações do Torque das Ferragens* nesta seção.
18. Deslize a metade fixa da embreagem no eixo da caixa de engrenagem, mas deixe os parafusos de montagem soltos.

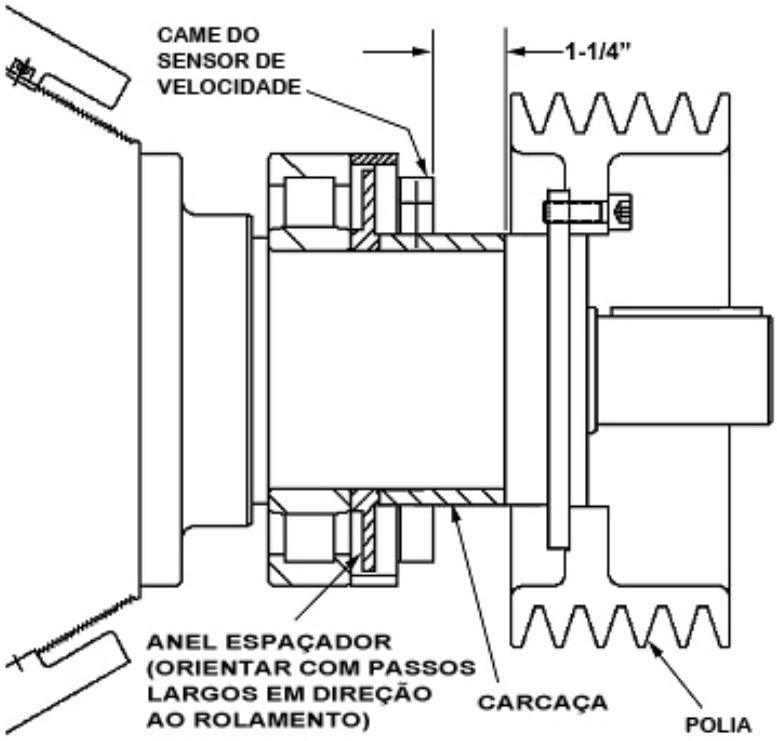


Figura 5-23 Instalação de Polia no Eixo da Caixa de Engrenagem

19. Reinstale o conjunto rotativo na centrífuga da segunte forma:
    a. Aplique composto anti-ferrugem nas superfícies de acasalamento dos pillow blocks e base da centrífuga.
    b. Usando um guincho, suspenda o conjunto rotativo da armação e abaixe para a centrífuga até que os pillow blocks entrem em contato com a base.

c. Insira os pinos de alinhamento nos pillow blocks, e use um martelo de bronze para assentar completamente os pinos na base; não aperte as porcas nos pinos de alinhamento.

d. Aplique composto antiengripante nos parafusos do pillow block e introduza os parafusos com anilhas através dos pillow blocks e para dentro da base. Aperte os parafusos de acordo com as *Especificações do Torque das Ferragens* nesta seção.

20. Instale correias motrizes no motor e nas polias do recipiente e correias de tensão de acordo com *Tensão da Correia Motriz* nesta seção.

21. Insira um satélite na metade da embreagem da caixa de engrenagem e posicione a metade da embreagem da caixa de engrenagem de forma que a superfície traseira se alinhe com face frontal da polia (Figura 5-24).

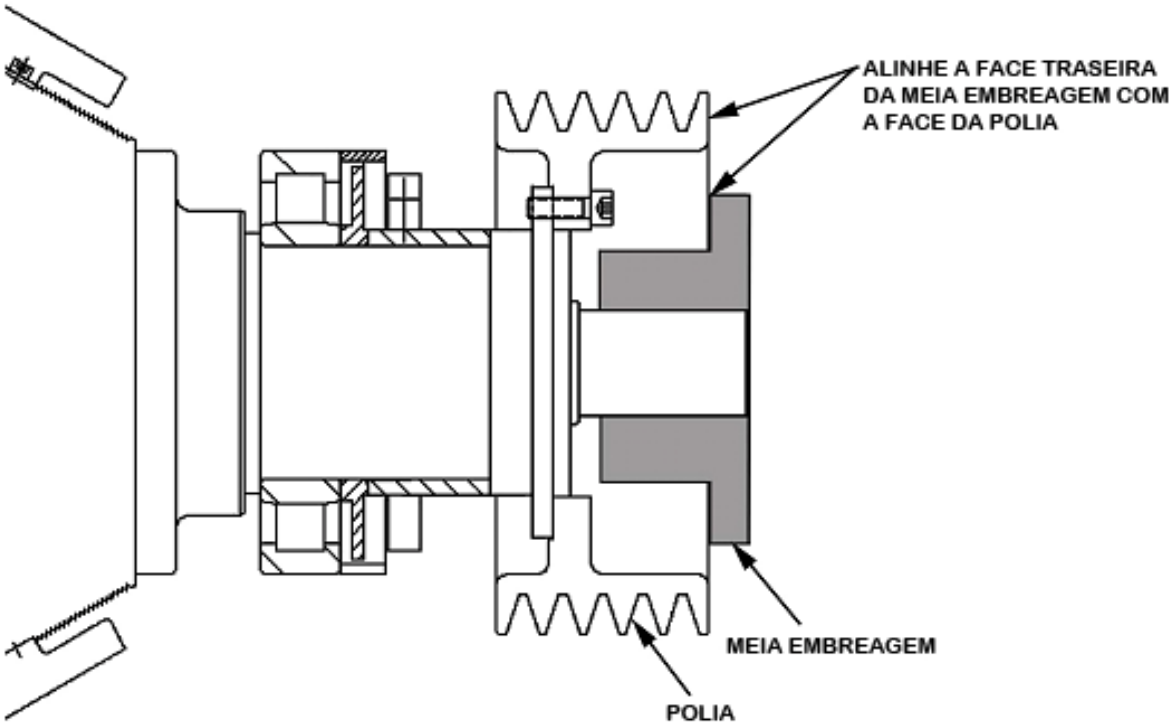


Figura 5-24 Instalação de Embreagem no Eixo da Caixa de Engrenagem

22. Deslize a metade da embreagem do eixo do motor ao engate com a metade da caixa de engrenagem, defina a folga entre as metades da embreagem em cerca de 0,1875" à 0.250" (4.8 mm à 6.4 mm) e, em seguida, posicione a embreagem axialmente para que o ponto médio do satélite esteja alinhado com o sensor de proximidade.

23. Gire a embreagem do eixo do motor até o parafuso de ajuste está alinhado com a chave do eixo, e aperte o parafuso de ajuste. Aperte os parafusos de montagem em ambas as metades de embreagem até 184 libra-pé (250 Nm).

24. Desenrole e reconecte os fios do sensor ao bloco do terminal na caixa de conexões e então reinstale a tampa da caixa de conexões.

25. Engraxe os rolamentos principais, de acordo com a Figura 5-1 e siga os seguintes passos:

a. Aplique energia elétrica, inicie a centrífuga e ajuste a velocidade do recipiente para 500 rpm.

b. Enquanto observa a temperatura dos rolamentos, injete graxa nova no pillow block até que os a graxa flua da porta de saída na metade inferior do pillow block ao lado da correia.

26. Encha a caixa de engrenagem com óleo recomendado (consulte a *Troca de Óleo da Caixa de Engrenagem* nesta seção). Execute o transportador de 10 a 15 minutos para permitir o aquecimento do óleo da caixa de engrenagem e depois volte a verificar o nível de óleo.

Note! Para evitar vazamentos, substitua a junta de bronze em plugues de enchimento de caixa de embreagem a cada vez que plugues forem removidos.

27. Feche a tampa da correia e prenda com parafusos apertando do centro da tampa para fora em ambas as direções.
28. Instale e prenda proteção de correias sobre o motor e as polias do conjunto do recipiente.
29. Conecte a tubulação de alimentação ao flange do componente de alimentação.
30. Aplique energia elétrica, e inicialize a centrífuga (consulte a Seção 4). Acompanhe atentamente o desempenho e verifique se há algum ruído incomum.

ESPECIFICAÇÕES DE TORQUE DAS FERRAGENS

Use apenas o hardware que é aprovado pela Derrick Corporation. O uso de hardware não aprovado pela Derrick e possivelmente inferior pode resultar em lesões graves aos funcionários e / ou danos ao equipamento. Além disso, qualquer garantia em vigor, seja escrita ou implícita, pode ser anulada por uso de hardware não aprovado. Entre em contato com a Derrick Corporation com perguntas relativas ao tipo de equipamento e o uso associado a centrífugas Derrick.

ATENÇÃO! O USO DE FERRAGENS DE QUALIDADE INFERIOR NÃO APROVADO PELA DERRICK E POSSIVELMENTE PODE RESULTAR EM LESÕES GRAVES AOS FUNCIONÁRIOS E / OU DANOS AO EQUIPAMENTO.

Especificações recomendadas de torque de assentamento para os vários tipos e tamanhos de equipamentos usados na centrífuga são mostradas nas próximas páginas.

Use o procedimento a seguir quando apertar equipamentos:

1. Use apenas um torquímetro calibrado.
2. Ao apertar mais de um parafuso, alterne entre os parafusos.
3. Sempre aborde o torque final em várias fases.

TORQUE DAS FERRAGENS				
Tipo	**Localização**	**Torque**		
		Libra Pé	**Pol-Lb**	**Nm**
M16	Metades superior e inferior do pillow block do rolamento principal	144	1726	195
M16	Luva do eixo da caixa de engrenagem de acionamento traseiro ao conjunto do recipiente	136	1628	184

TORQUE DAS FERRAGENS				
Tipo	**Localização**	**Torque**		
		Libra Pé	**Pol-Lb**	**Nm**
M12	Recipiente e motores de caixa de engrenagem de acionamento traseiro à base	41	496	56
M8	Retentor do rolamento do transportador ao alojamento do rolamento	12	142	16
M10	Alojamento do rolamento do transportador ao transportador	32	381	43
M10	Placa de bloqueio à parte superior do recipiente de líquidos	24	283	32
M10	Tampa superior ao invólucro	24	283	32
M16	Parte superior do recipiente de líquidos ao conjunto do recipiente	136	1628	184
M16	Caixa de engrenagem de acionamento traseiro ao conjunto do recipiente	100	1204	136
M10	Polia paro flange de montagem na caixa de engrenagem de acionamento traseiro	24	283	32
M6	Polia montando flange à caixa de engrenagem de acionamento traseiro	12	142	16
M24	Pillow block do rolamento principal para base	502	6018	680
M12	Tubo de alimentação para pillow block	55	650	75

PEÇAS SOBRESSALENTES RECOMENDADAS

A tabela de peças sobressalentes a seguir contem as peças necessárias para apoiar uma única Centrífuga DE-7200 durante dois anos. Os componentes mais suscetíveis ao desgaste são incluídos; entretanto, todas as substituições de peças em potencial não podem ser previstas. O estoque completo de peças de reposição deve ser baseado na experiência do usuário com equipamentos similares.

Considere os seguintes fatores ao estabelecer um estoque de peças de reposição:

- Ciclo de serviço
- Temperatura ambiente
- Ambiente Operacional

Nº da Peça	Descrição	Validade	2 Anos Qtd
Base - 16601-00			
G0007725	Pino Cônico	Não	4
G0007726	Tira de Feltro	Não	1
G0007727	Tira de Feltro	Não	2
Recipiente - 16603-00			
G0007808	Rolamento de Rolete, Extremidade de Líquidos.	Sim	1
G0007809	Anel de Feltro	Não	1
G0007810	Retentor tipo gaxeta, Extremidade de Líquidos.	Não	1
G0007811	Anel em O, Anel de Fixação.	Não	1
G0007813	Anel em O, Extremidade de Líquidos.	Não	3
G0007827	Arado	Sim	4
G0007832	Parafuso, Cabeça Oca.	Não	6
G0007820	Anel de Retenção	Não	1
G0007821	Anel de Retenção	Não	1
G0007822	Rolamento de Rolete, Extremidade de Sólidos	Sim	1
G0007823	Retentor tipo gaxeta, Anel em O, Caixa de Engrenagem	Não	1
G0007829	Anel em O, Polia Acionadora	Não	1
G0007763	Parafuso, Cabeça Sextavada	Não	12
G0007729	Arruela, Plana	Não	12
Invólucro e Tampa - 16602-00			
G0007759	Fita de Retenção	Não	1
G0007752	Retentor de Borracha	Não	1 Conjunto
G0007767	Mola de Pressão	Não	2
16995-00	Placas Desgastáveis.	Não	1 Conjunto
Transportador - 16604-00			
G0007875	Retentor do Eixo	Não	1

Nº da Peça	Descrição	Validade	2 Anos Qtd
G0007876	Retentor do Eixo	Não	1
G0007877	Rolamento de Rolete, Transportador.	Não	1
G0007883	Retentor de Lábio, Anel em V	Não	1
Proteção da Correia - 16605-00			
G0007751	Parafuso, Cabeça Oca.	Não	4
G0007855	Arruela de Travamento	Não	4
G0007856	Isolador de Borracha	Não	4
Conjunto de Componente de Alimentação - 16606-00			
G0007888	Tubulação de Alimentação	Sim	1
Componentes do Acionador Diversos - 16621-00			
G0007964	Acionamento por correia	Não	5
G0008994	Embreagem de Sobrecarga	Não	1
Peças Diversas - 16674-00			
G0008986	Óleo de Engrenagem	Sim	2 Gal
G0008185	Cartucho de Graxa	Sim	20 Tubos
Unidade de Engrenagem - 16672-00			
G0008169	Anel de Retenção	Não	2
Lista de Peças Elétricas - 16593-00			
G0007265	Sensor RTD	Não	1
G0007861	Sensor de Velocidade	Não	1
Gabinete de Controle - 16472-00-002			
G0007698	Fusível, 60A, Classe J	Não	3
G0007981	Fusível, 1,5A	Não	3
G0007225	Fusível, 150A, Classe J	Não	2
G0007632	Fusível, 225A, Classe T	Não	3
G0002910	Fusível, 2,5A	Não	2
G0002911	Fusível, 7A	Não	1
G0003493	Fusível, 15A	Não	3
G0002301	Elemento de Filtro de Ar, DX	Sim	1
G0002302	Elemento de Filtro de Ar, BX	Sim	1

Nº da Peça	Descrição	Validade	2 Anos Qtd
G0008005	Trinco da Porta	Não	4
G0008349	Bateria PLC	Sim	1
G0007228	PLC	Não	1
G0007232	Barreira de Segurança Intrínseca, Interruptor de Vibração.	Não	1
G0007233	Barreira de Segurança Intrínseca, Sensor RTD.	Não	1
G0007234	Barreira de Segurança Intrínseca, Sensor de Velocidade.	Não	1
G0003504	Supressor de Oscilação	Não	1
G0007863	Mouse	Não	1
G0007231	Comutador Ethernet, 6 portas	Não	1
G0008825	Interface do Operador (Painel de Controle)	Não	1
G0002881	Unidade de Ar Condicionado, 12.000 BTU	Não	1
G0003552	Fonte de Alimentação	Não	1
Painel de Controle Elétrico - 16607-00			
G0002909	Fusível de Tempo de Atraso, 1,25A	Não	1
G0004195	Fusível de Tempo de Atraso, 0,5A	Não	2
G0003789	Barreira de Segurança Intrínseca	Não	1

SOLUÇÃO DE PROBLEMAS

Embora a falha de equipamento seja improvável, avarias devido a um erro operacional ou outro problema podem resultar em paralização desnecessária da máquina e deve ser corrigido o mais rapidamente possível. Os procedimentos de solução de problemas apresentados nesta seção ajudarão os técnicos a isolar e corrigir avarias.

Procedimento de Solução de Problemas

A análise de falhas deve proceder logicamente da causa mais simples à mais complexa. O problema mais difícil é um desligamento inesperado ou incapacidade de iniciar. Sempre elimine as causas óbvias de mau funcionamento antes de prosseguir com possibilidades mais complexas.

Uma vez que mais de uma causa pode ser responsável por mau funcionamento, o técnico deve proceder metodicamente para eliminar todas as possíveis causas e tomar todas as ações corretivas a cada passo do processo de solução de problemas. Onde mudanças nos procedimentos operacionais é o melhor plano de ação, recomendações adequadas estão incluídas.

Em geral, um desligamento inesperado da centrífuga é devido a uma interrupção de energia elétrica que tenha desligado os motores acionadores. Componentes de segurança são instaladas em áreas-chave do sistema de controle elétrico da centrífuga para desligar o motor elétrico se os parâmetros de segurança, tais como temperatura do motor, vibrações ou torque do transportador são excedidas. A interrupção de energia pode ser devido a um ou mais fatores, incluindo uma falha de energia local.

Tabela de Solução de Problemas

O gráfico de solução de problemas consiste em modos de falha, possível(eis) causa(s), e plano(s) de ação recomendado(s). Todas as verificações de continuidade elétrica neste procedimento são executadas sem o fornecimento de energia elétrica para a centrífuga. Bloqueie (LO) e etiquete (TO) o equipamento antes de tentar realizar qualquer verificação de continuidade.

ATENÇÃO! VERIFICAÇÕES DE CONTINUIDADE DEVEM SER REALIZADAS SEM ELETRICIDADE FORNECIDA À CENTRÍFUGA. BLOQUEIE (LO) E ETIQUETE (TO) ENERGIA ELÉTRICA ANTES DE TENTAR VERIFICAR A CONTINUIDADE.

Além das informações sobre solução de problemas, o técnico deve consultar os diagramas esquemáticos no fim desta seção e aos diagramas esquemáticos e de fiação adequados na Seção 6 e a descrição e teoria de funcionamento da Seção 1 para obter ajuda adicional na solução de problemas.

RESOLUÇÃO DE PROBLEMAS DA CENTRÍFUGA DE-7200	
Causa Possível	**Procedimento de Isolamento & Ação Corretiva**
Modo de Falha 1: Líquido Aceitável, Bolo Fino Demais	
Sólidos insuficientes na alimentação	Aumente a taxa de alimentação.
	Aumente a abertura do vertedouro (consulte a Seção 4).
	Reduza a velocidade diferencial.
Queda na taxa de alimentação da bomba	Aumente a taxa de alimentação.
	Verifique a bomba de alimentação e, se necessário, verifique o desgaste e substitua peças desgastadas.
	Verifique o retentor do eixo da bomba e corrija eventuais defeitos.
	Selecione RESTAURAR na tela de Restauração de Falha para reiniciar a taxa de fluxo.
Modo de Falha 2: Baixa Qualidade de Líquidos, Bolo Aceitável	
Velocidade do recipiente baixa demais.	Aumente a velocidade do recipiente.
	Reduza a taxa de alimentação.
Excessiva quantidade de sólidos na alimentação	Reduza a quantidade de sólidos na alimentação ou adicionar fluxo de diluição, se possível.
Mudança nas características de alimentação	Reduza a quantidade de sólidos na alimentação ou as configurações de máquinas em geral, otimizar, ou seja, ajustar a velocidade da bacia, velocidade diferencial, e abrindo açude.
Aumento da umidade dos sólidos	Re-otimize as configurações da máquina.
	Reduza a taxa de alimentação.
	Aumente a abertura do vertedouro (consulte a Seção 4).
	Reduza a velocidade diferencial.
Correias do transportador excessivamente gasta. Inspecione as correias através dos orifícios de descarga de sólidos	Retire e desmonte o recipiente, e inspecione as correias do transportador (consulte *Substituição do Rolamento do Transportador para remover o transportador).* Reparar ou substituir o transportador, se necessário.
Modo de Falha 3: Vibração Excessiva	
O conjunto do recipiente desequilibrado devido ao desgaste mecânico desigual, peças desgastadas ou correia do transportador deformada.	Retire e desmonte o recipiente, e inspecione as correias do transportador (consulte *Substituição do Rolamento do Transportador para remover o transportador).* Reparar ou substituir o transportador, se necessário.

RESOLUÇÃO DE PROBLEMAS DA CENTRÍFUGA DE-7200	
Causa Possível	**Procedimento de Isolamento & Ação Corretiva**
Modo de Falha 3: Vibração Excessiva (Cont.)	
Defeito no rolamento do transportador devido à lubrificação insuficiente, produto de vedação vencido, ou o desgaste normal.	Retire e desmonte o recipiente, e inspecione o rolamento do transportador (consulte *Substituição do Rolamento do Transportador).* Substitua o rolamento do transportador.
Defeito nos rolamentos principais do recipiente.	Remova o conjunto rotativo e substitua os rolamentos (consulte *Substituição do Rolamento Principal* nesta seção).
Acúmulo excessivo de sólidos no recipiente e/ou transportador.	Execute o procedimento de limpeza (consulte *Manutenção Preventiva).*
Modo de Falha 4: Sem descarga de líquido, Material de alimentação não tratado saindo pela saída de descarga de líquido.	
Acúmulo de sólidos entre as correias, os sólidos não são transportados para a descarga, mas sim descarregados com o líquido.	Desligue o motor de acionamento da bomba de alimentação e do conjunto do recipiente, mas mantenha o motor do transportador funcionando e permita a entrada de água para limpeza dentro máquina. Se os sólidos emergirem antes do recipiente parar completamente, reinicie a centrífuga.
	Abra a tampa superior e insira a mangueira dentro da abertura de descarga de líquidos e sólidos e lave com descarga de água o interior do recipiente (de preferência água quente).
	Se a lavagem for malsucedida em limpar o bloqueio, remova o conjunto rotativo e remova o transportador para facilitar uma limpeza meticulosa. (consulte *Substituição do Rolamento do Transportador*).
Modo de Falha 5: Alto consumo de energia, Máquina obstruída	
Sólidos acumulados dentro do invólucro	Abra a tampa superior, e através dela limpe o interior do invólucro, exterior do recipiente, e a calha de descarga de sólidos.
Modo de Falha 6: Máquina Entupida ao Iniciar Após um Desligamento Breve	
Excessivo volume de sólidos na alimentação devido à sedimentação na linha de fornecimento	Execute o procedimento de limpeza (consulte *Manutenção Preventiva).*
	Evitar futuras repetições limpando a linha de alimentação logo após o desligamento da máquina.
Modo de Falha 7: Desligamento da Máquina Devido ao Consumo Excessivo de Energia Durante a Inicialização	
Calha de descarga entupida	Limpar a calha de descarga de todos os sólidos acumulados.

RESOLUÇÃO DE PROBLEMAS DA CENTRÍFUGA DE-7200	
Causa Possível	**Procedimento de Isolamento & Ação Corretiva**
Modo de Falha 8: Temperatura do Rolamento Principal Excessivamente Alta	
Lubrificação insuficiente	Lubrifique os rolamentos (consulte *Manutenção Preventiva*).
Excesso de graxa	Remova a graxeira, e direcione o jato de ar comprimido filtrado para remover a graxa.
Graxa incorreta	Lubrifique com graxa recomendada (consulte *Manutenção Preventiva*).
Rolamento com defeito	Substitua ambos os rolamentos principais (consulte *Substituição do Rolamento Principal*).

MENSAGENS DE ALARME E DE FALHA

Intervenções são necessárias caso uma mensagem apareça para alertar o operador do acontecimento de alguma anomalia. Mensagens de alarme significam que a condição atual deve ser corrigida ou a centrífuga pode ser desligado automaticamente. Mensagens de falha informam ao operador que uma falha que exige desligamento automático ocorreu.

Consulte a tabela a seguir para mensagens de alarme e falha, suas causas e ações corretivas para assistência em analisar as mensagens.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Falha por sobrecarga no motor do Compressor do Ar Condicionador	
Motor puxando corrente em excesso	Troque o motor do compressor do ar condicionado, em caso de defeito, ou remova outra causa do consumo de corrente excessiva.
Falha por sobrecarga no motor do Ventilador Interno do Ar Condicionador	
Motor puxando corrente em excesso	Troque o motor do ventilador interno, em caso de defeito, ou remova outra causa do consumo de corrente excessiva.
Falha de Pressão Alta ou Baixa no Refrigerante do Ar Condicionado	
Verifique a pressão do refrigerante, pressão alta indica sobrecarga, e pressão baixa indica vazamentos no sistema	Se a pressão estiver alta, reduza a quantidade de refrigerante, se baixa, corrija o(s) vazamento(s) e carregue o sistema novamente.
Velocidade Máxima do Recipiente Excedida, Desligamento	
Conexão incorreta ou solta do sensor de velocidade ou sensor de velocidade com defeito	Se a leitura na tela do status do VFD do Recipiente é de cerca de 4000 RPM, verifique a conexão (consulte a Seção 3); se a conexão estiver segura, substituir o sensor.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
O VFD do recipiente permitiu que o recipiente excedesse o limite de velocidade máxima pré-definida	Substitua o VFD do recipiente, e reinicie a centrifugar quando a velocidade de monitoramento estiver próxima.
Alarme de Alto Torque do Recipiente, Reduzir a taxa de alimentação	
O Torque do recipiente excedeu o limite pré-definido	Reduza a taxa de alimentação.
Falha e Desligamento por Alto Torque do Recipiente, Executar limpeza e reduzir a taxa de alimentação	
O Torque do recipiente excedeu o limite pré-definido	Após o desligamento automático, execute o procedimento de limpeza para remover o acúmulo de sólidos, e reinicie a centrifugar com a taxa de alimentação reduzida.
Alarme do VFD do Recipiente, Consulte a Seção de Solução de Problemas do Manual do Usuário	
VFD do Recipiente com Defeito	Pressione PARAR, e desligar e depois ligar o ciclo de energia. Se o alarme não sumir, substitua o VFD do Recipiente.
Erro de Comunicação do VFD do Recipiente	
O VFD do Recipiente não está se comunicando com o PLC	Confirme que o LED verde ao lado do cabo Ethernet está aceso, indicando que o hub está funcionando.
	Verifique as conexões entre o VFD e o PLC do recipiente, e corrija eventuais defeitos.
	Substitua o VFD do recipiente, se nenhum outro defeito for encontrado.
Alarme de Limite Excedido do Acionador VFD do Recipiente, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Motor de Acionamento do Recipiente puxando corrente em excesso	Troque o motor, em caso de defeito, ou remova outra causa do consumo de corrente excessiva.
Desligamento ou Falga do VFD do Recipiente, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Detecção de falha do VFD, causando desligamento	Verifique e substitua o VFD do recipiente.
Alarme de Aviso de Aterramento do VFD do Recipiente, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Motor do recipiente tem acesso para aterramento	Verifique se há aterramento no motor do recipiente e conexões para a saída do acionador, e corrija o defeito.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Alarme por Perda de Fase de entrada no VFD do Recipiente, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Aterramento monofásico detectado entre o VFD e o motor	Verifique a fiação entre o VFD e o motor; corrija o(s) defeito(s).
	Verifique o enrolamento do motor para a fase aterrada; remova o aterramento, se houver, ou substitua o motor.
Alarme por Perda de Força do VFD do Recipiente, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Perda na entrada de energia ou fornecimento de baixa tensão	Monitore e corrija o(s) defeito(S) na entrada de energia.
Alarme de Sub-tensão do VFD do Recipiente, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Perda na entrada de energia ou fornecimento de baixa tensão	Monitore e corrija o(s) defeito(S) na entrada de energia.
Falha de Comunicação com o Sensor de Velocidade do Recipiente	
Conexão incorreta ou solta do sensor de velocidade ou sensor de velocidade com defeito	Se a leitura na tela do status do VFD do Recipiente é de cerca de 4000 RPM, verifique a conexão (consulte a Seção 3); se a conexão estiver segura, substituir o sensor.
Conexão incorreta no PLC	Verifique se todos os conectores estão firmemente assentados, conforme descrito nesta seção.
Transmissor/ Barreira intrínseco do Sensor de velocidade defeituosa	Verifique e substitua a barreiras transmissor/intrínseco, em caso de defeito.
VFD da Bomba com Defeito	Verifique e substitua o VFD, em caso de defeito
Falha de Comunicação com o Sensor de Temperatura da Extremidade de Líquido	
Conexão incorreta ou solta no sensor de temperatura	Se a leitura for constantemente entre os 392 °F (200° C) verifique e corrija a conexão (consulte a Seção 3 e o diagrama esquemático eléctrico na Seção 8).
Conexão incorreta no PLC	Verifique se todos os conectores do PLC estão firmemente assentados, conforme descrito na Seção 3.
Sensor de temperatura com defeito	Se a leitura for constantemente entre os 392 °F (200° C), o sensor está com defeito, substitua o sensor.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Transmissor/ Barreiras intrínseco da extremidade de líquido defeituosa ou má conectada	Verifique a conexão e/ou substitua o transmissor, em caso de defeito.
VFD do Recipiente com Defeito	Verifique e substitua o VFD, em caso de defeito.
Falha de Comunicação com o Sensor de Temperatura da Extremidade de Sólido	
Conector do sensor de temperatura inseguro ou desconectado	Se a leitura for constantemente entre os 392 °F (200° C) verifique e corrija a conexão (consulte a Seção 3 e o diagrama esquemático eléctrico na Seção 8).
Conexão incorreta no PLC	Verifique se todos os conectores do PLC estão presos, conforme descrito nesta Seção.
Sensor de temperatura com defeito	Se a leitura for constantemente aos 392 °F (200° C), o sensor está com defeito, substitua o sensor.
Falha de Comunicação com o Sensor de Temperatura da Extremidade de Sólido (Cont.)	
Má conexão no transmissor/ barreiras intrínseco da extremidade de líquido ou transmissor com defeito	Se a leitura for constantemente aos 392 °F (200° C) verifique e corrija a conexão, substitua o transmissor, em caso de defeito.
VFD do Recipiente com Defeito	Verifique e substitua o VFD, em caso de defeito
Programa de Controle Baixando do Cartão de Memória para o Controlador	
Re-carregamento do programa de PLC a partir do cartão de memória concluído	Inicialize a centrífuga, e continue a operação.
Bateria Interna do Controlador Baixa, Substituir	
Conexões da bateria do PLC não seguras	Verifique as conexões e corrija, se necessário.
Bateria do PLC fraca	Substitua a bateria.
Alarme de Alto Torque do Transportador, Reduzir a taxa de alimentação	
O Torque do transportador excedeu o limite pré-definido	Reduza a taxa de alimentação.
Falha e Desligamento por Alto Torque do Transportador, Executar limpeza e reduzir a taxa de alimentação	
O Torque do transportador excedeu o limite pré-definido	Após o desligamento automático, execute o procedimento de limpeza para remover o acúmulo de sólidos, e reinicie a centrifugar com a taxa de alimentação reduzida.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Alarme do VFD do Transportador, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Cabo de sinal do sensor de temperatura desconectado	Verifique e corrija a conexão (consulte a Seção 3 e o diagrama esquemático eléctrico na Seção 8).
Temperatura do VFD muito alta	Verifique a tela de status do VFD do Transportador para temperatura e alarme; desligue, bloquei (LO), e etiquete (TO) a centrífuga para determinar e corrigir a causa do superaquecimento.
Carga do VFD muito alta	Reduza a taxa de alimentação da bomba.
Erro de Comunicação do VFD do Transportador	
O VFD do transportador não está se comunicando com o PLC	Confirme que o LED verde ao lado do cabo Ethernet está aceso, indicando que o hub está funcionando.
	Verifique as conexões entre o VFD e o PLC do transportador, e corrija eventuais defeitos.
	Substitua o VFD do transportador, se nenhum outro defeito for encontrado.
Desligamento ou Falga do VFD do Transportador, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Detecção de falha do VFD, causando desligamento	Verifique e substitua o VFD do transportador.
Alarme de Aviso de Aterramento do VFD do Transportador, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Motor do transportador tem acesso para aterramento	Verifique se há aterramento no motor do transportador e conexões para a saída do acionador, e corrija o defeito.
Alarme por Perda de Fase de entrada no VFD do Transportador, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Aterramento monofásico detectado entre o VFD e o motor	Verifique a fiação entre o VFD e o motor; corrija o(s) defeito(s).
	Verifique o enrolamento do motor para a fase aterrada; remova o aterramento, se houver.
Alarme por Perda de Força do VFD do Transportador, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Perda na entrada de energia ou fornecimento de baixa tensão	Monitore e corrija o(s) defeito(S) na entrada de energia.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Alarme de Sub-tensão do VFD do Transportador, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Perda na entrada de energia ou fornecimento de baixa tensão	Monitore e corrija o(s) defeito(S) na entrada de energia.
Alarme de Temperatura Alta no Gabinete Elétrico	
PLC detectou alta temperatura dentro do gabinete de controle	Verifique se o ar condicionado estiver em funcionando, repare ou substitua o ar condicionador, em caso de defeito.
	Reduzir a carga por diminuição o recipiente, da velocidade diferencial do transportador, e/ou da taxa de alimentação da bomba.
	Verifique as temperaturas do VFD (consulte a Seção 4); substitua o VFD caso esteja com defeito.
Falha e Desligamento por Alta temperatura no Gabinete Elétrico	
PLC desligou a centrífuga devido a alta temperatura dentro do gabinete de controle	Verifique se o ar condicionado estiver em funcionando, repare ou substitua o ar condicionador, em caso de defeito.
	Reduzir a carga por diminuição o recipiente, da velocidade diferencial do transportador, e/ou da taxa de alimentação da bomba.
	Verifique as temperaturas do VFD (consulte a Seção 4); substitua o VFD caso esteja com defeito.
A temperatura interior do gabinete de controle está muito elevada, causando o desligamento	Verifique se o ar condicionado está funcionando, repare ou substitua como indicado. Inspecione o interior do gabinete e remover a causa da alta temperatura, se houver. Reinicie a centrífuga após a remoção da causa da alta temperatura.
Interruptor de Parada de Emergência Ativado, Desligamento	
PARAGEM DE EMERGÊNCIA pressionado	Remova o motivo da parada de emergência, e depois reinicie a centrifugar.
Falha de Alta vibração e Desligamento, Corrigir o Problema e Pressionar o botão Restaurar	
Vibração excessiva causou o acionamento do interruptor de vibração, resultando na interrupção da alimentação e desligamento de centrífuga	Conjunto rotativo sobrecarregado ou obstruído, produzindo uma condição de desequilíbrio. Remova o motivo da vibração em excesso, e reinicie a centrifugar.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Alarme de Alta Temperatura do Rolamento Principal da Extremidade de Líquido	
Conector do sensor de temperatura inseguro ou desconectado	Se a leitura for constantemente entre os 392 °F (200° C) verifique e corrija a conexão (consulte a Seção 3 e o diagrama esquemático eléctrico na Seção 8).
Lubrificação do rolamento insuficiente	Lubrificar os rolamentos (consulte a Manutenção Preventiva nesta seção).
Graxa em excesso	Remova a graxeira, e direcione o jato de ar comprimido filtrado para remover a graxa.
Graxa incorreta	Lubrificar com graxa recomendada (consulte a *Manutenção Preventiva* nesta seção).
Rolamento com defeito	Substitua ambos os rolamentos defeituosos (consulte *Substituição de Rolamentos Principais* nesta seção).
Falha e Desligamento por Alta Temperatura do Rolamento Principal da Extremidade de Líquido	
Lubrificação do rolamento insuficiente	Lubrificar os rolamentos (consulte a Manutenção Preventiva nesta seção).
Graxa em excesso	Remova a graxeira, e direcione o jato de ar comprimido filtrado para remover a graxa.
Graxa incorreta	Lubrificar com graxa recomendada (consulte a *Manutenção Preventiva* nesta seção).
Rolamento com defeito	Substitua ambos os rolamentos defeituosos (consulte *Substituição de Rolamentos Principais* nesta seção).
Alarme do VFD da Bomba, Consulte a Seção de Solução de Problemas do Manual do Usuário	
O VFD da bomba precisa ser reinicializado	Pressione PARAR, e desligar e depois ligar o ciclo de energia. Se o alarme não sumir, substitua o VFD da bomba.
Erro de Comunicação do VFD da Bomba	
O VFD da bomba não está se comunicando com o PLC	Confirme que o LED verde ao lado do cabo Ethernet está aceso, indicando que o hub está funcionando.
	Verifique as conexões entre o VFD e o PLC da bomba, e corrija eventuais defeitos.
	Substitua o VFD da bomba, se nenhum outro defeito for encontrado.

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Alarme de Limite Excedido do Acionador VFD da bomba, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Motor de Acionamento da bomba puxando corrente em excesso	Troque o motor, em caso de defeito, ou remova outra causa do consumo de corrente excessiva.
Falha do VFD da Bomba, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Detecção de falha do VFD, causando desligamento	Verifique e substitua o VFD da bomba.
Alarme de Aviso de Aterramento do VFD da Bomba, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Motor da bomba tem acesso para aterramento	Verifique o motor da bomba e conexões para direcionar a saída para um aterramento; remova ligação ao aterramento.
Alarme por Perda de Fase de entrada no VFD da Bomba, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Aterramento monofásico detectado entre o VFD e o motor da bomba	Verifique a fiação entre o VFD e o motor; corrija o(s) defeito(s).
	Verifique o enrolamento do motor para a fase aterrada; remova o aterramento, se houver, ou substitua o motor.
	Substitua VFD.
Alarme por Perda de Força do VFD da Bomba, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Perda na entrada de energia ou fornecimento de baixa tensão	Monitore e corrija o(s) defeito(S) na entrada de energia.
Alarme de Sub-tensão do VFD da Bomba, Consulte a Seção de Solução de Problemas do Manual do Usuário	
Perda na entrada de energia ou fornecimento de baixa tensão	Monitore e corrija o(s) defeito(S) na entrada de energia.
Alarme de Alta Temperatura do Rolamento Principal da Extremidade de Sólidos	
Lubrificação do rolamento insuficiente	Lubrificar os rolamentos (consulte a Manutenção Preventiva nesta seção).
Graxa em excesso	Remova a graxeira, e direcione o jato de ar comprimido filtrado para remover a graxa.
Graxa incorreta	Lubrificar com graxa recomendada (consulte a *Manutenção Preventiva* nesta seção).

Mensagens de alarme e de falha	
Causa	**Ação Corretiva**
Rolamento com defeito	Substitua ambos os rolamentos defeituosos (consulte *Substituição de Rolamentos Principais* nesta seção).
Falha e Desligamento por Alta Temperatura do Rolamento Principal da Extremidade de Sólidos	
Lubrificação do rolamento insuficiente	Lubrificar os rolamentos (consulte a Manutenção Preventiva nesta seção).
Graxa em excesso	Remova a graxeira, e direcione o jato de ar comprimido filtrado para remover a graxa.
Graxa incorreta	Lubrificar com graxa recomendada (consulte a *Manutenção Preventiva* nesta seção).
Rolamento com defeito	Substitua ambos os rolamentos defeituosos (consulte *Substituição de Rolamentos Principais* nesta seção).

INDICADORES DE CONTROLE DE COMPONENTE

Vários indicadores são fornecidos para exibir o status operacional dos componentes do gabinete de comando. Figuras 5-25 a 5-28 localizam e definem as indicações apresentadas nestes componentes. Se for caso, ações corretivas são incluídas para ajudar o operador em análise de falhas.

Tensão perigosamente alta está presente no gabinete de controle. Tendo em vista que abrir a porta do gabinete de controle e ignorar o sistema de drenagem são necessários para verificar os indicadores, apenas o pessoal treinado e qualificado deve ser autorizado a realizar esses procedimentos. Tenha o máximo cuidado em certificar-se de que a atmosfera ambiente esteja livre de vapores perigosos antes de abrir a porta do gabinete e ignorar o sistema de drenagem.

ATENÇÃO! TENSÃO PERIGOSAMENTE ALTA ESTÁ PRESENTE. APENAS PESSOAL TREINADO E QUALIFICADO DEVE TER PERMISSÃO PARA ABRIR A PORTA DO GABINETE DE CONTROLE ENQUANTO A ENERGIA ESTIVER LIGADA.

ATENÇÃO! GASES PERIGOSOS PODEM CAUSAR EXPLOSÃO. CERTIFIQUE-SE DE QUE A ATMOSFERA AMBIENTE ESTEJA LIMPA DE TODOS OS POTENCIAIS GASES EXPLOSIVOS ANTES DE ABRIR A PORTA DO GABINETE DE CONTROLE.

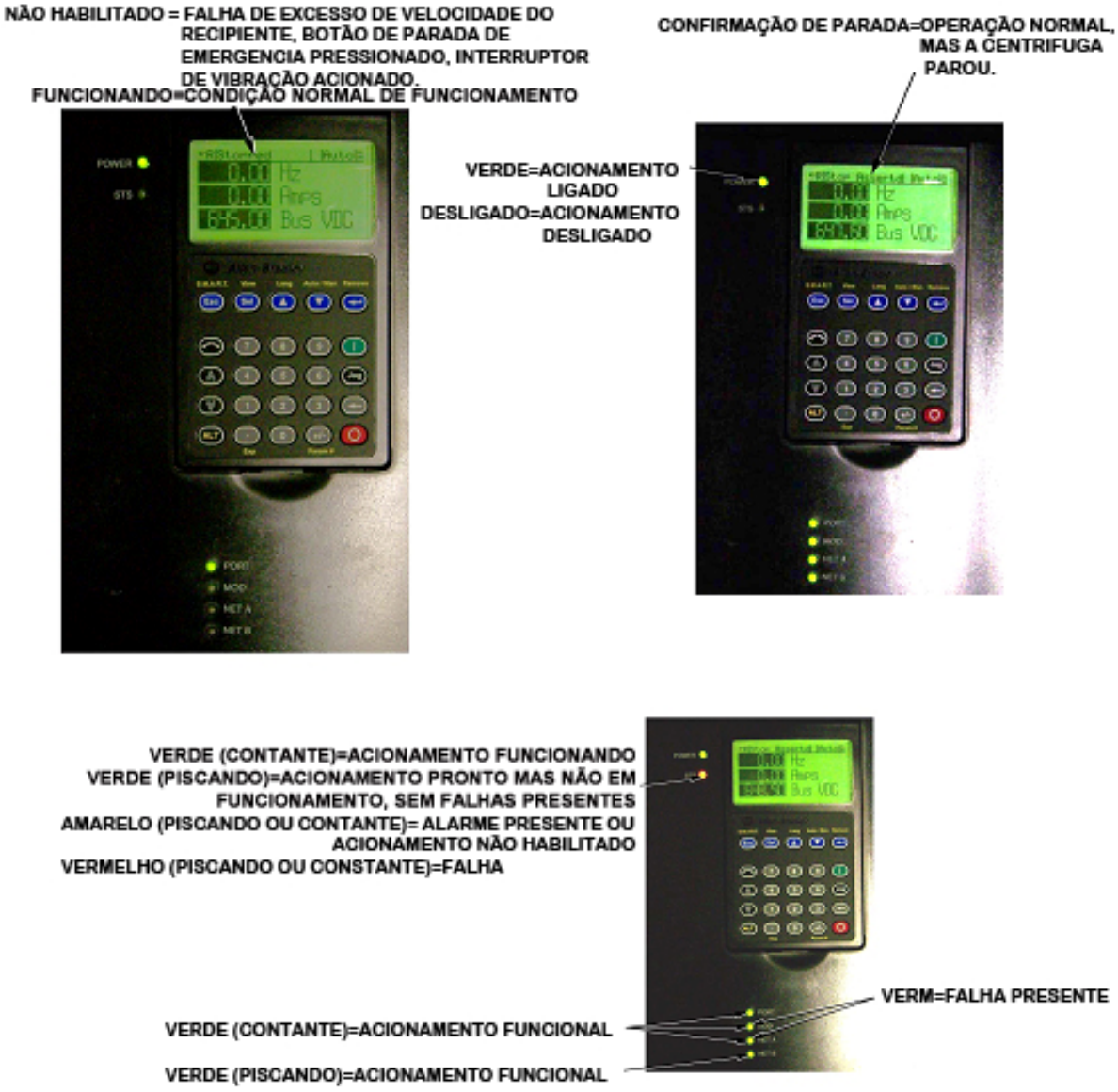

NÃO HABILITADO = FALHA DE EXCESSO DE VELOCIDADE DO RECIPIENTE, BOTÃO DE PARADA DE EMERGENCIA PRESSIONADO, INTERRUPTOR DE VIBRAÇÃO ACIONADO.
FUNCIONANDO=CONDIÇÃO NORMAL DE FUNCIONAMENTO
CONFIRMAÇÃO DE PARADA=OPERAÇÃO NORMAL, MAS A CENTRIFUGA PAROU.
VERDE=ACIONAMENTO LIGADO
DESLIGADO=ACIONAMENTO DESLIGADO
VERDE (CONTANTE)=ACIONAMENTO FUNCIONANDO
VERDE (PISCANDO)=ACIONAMENTO PRONTO MAS NÃO EM FUNCIONAMENTO, SEM FALHAS PRESENTES
AMARELO (PISCANDO OU CONTANTE)= ALARME PRESENTE OU ACIONAMENTO NÃO HABILITADO
VERMELHO (PISCANDO OU CONSTANTE)=FALHA
VERM=FALHA PRESENTE
VERDE (CONTANTE)=ACIONAMENTO FUNCIONAL
VERDE (PISCANDO)=ACIONAMENTO FUNCIONAL

Figura 5-25 Indicadores VFD

INDICADORES DE CONTROLE DE COMPONENTE (CONT.)

VERDE (CONSTATE) = PLC SE COMUNICANDO COM TODOS OS DISPOSITIVOS
VERDE (PISCANDO)=UM OU MAIS DISPOSITIVOS NÃO RESPONDEM
VERMELHO (PISCANDO) =PLC NÃO ESTÁ SE COMUNICANDO COM NENHUM DISPOSITIVO OU ESTÁ DEFEITUOSO
DESLIGAR= MEMÓRIA DO CONTROLADOR VAZIA
VERDE (CONSTANTE)=MODO FUNCIONANDO
DESLIGAR= MODO DE PROGRAMAÇÃO
DESLIGAR=FUNCIONAMENTO NORMAL
VERDE (CONSTANTE)=PLC OK
VERDE (PISCANDO)=PLC ARMAZENANDO OU CARREGANDO PROGRAMA (OBSERVAÇÃO 1)
VERMELHO (PISCANDO)=FALHA RECUPERAVEL GRAVE (OBSERVAÇÃO 2)
VERMELHO (CONSTANTE)=FALHA NÃO RECUPERAVEL (OBSERVAÇÃO 3)
DESLIGAR=SEM ENERGIA APLICADA
DESLIGAR= BATERIA BOA
VERMELHO (CONSTANTE)=95% DA BATERIA DESCARREGADA OU NÃO INSTALADA
DESLIGAR=SEM ENERGIA PARA O PLC (OBSERVAÇÃO 4)
VERDE(CONSTANTE)=FUNCIONAMENTO NORMAL
VERMELHO(CONSTANTE)=EXECUTANDO AUTO-TESTE OU FALHA INRECUPERAVEL (OBSERVAÇÃO 5)
VERDE (CONSTANTE)=FUNCIONAMENTO NORMAL
VERDE (PISCANDO) = PLC LENDO/GRAVANDO NO CARTÃO
VERMELHO (PISCANDO)=SISTEMA DE ARQUIVO INVALIDO NO CARTÃO
DESLIGAR=FUNCIONAMENTO NORMAL
VERDE(CONSTANTE OU ISCANDO)=FUNCIONAMENTO NORMAL
DESLIGAR=FUNCIONAMENTO NORMAL
VERDE (CONSTANTE)=FUNCIONAMENTO NORMAL
VERDE (PISCANDO)=SEM CONEXÕES (OBSERVAÇÃO 6)
VERMELHO (CONSTANTE)=PORTA JÁ EM USO (OBSERVAÇÃO 7)
VERMELHO/VERDE (PISCANDO)=EXECUTANDO AUTO-TESTE

OBSERVAÇÕES:
1. AGUARDE O CARREGAMENTO DA MEMÓRIA TERMINAR.
2. TROQUE A CHAVE DE "PROG" PARA "FUNCIONAR" E ENTÃO DE VOLTA PARA "REM", DEPOIS DESLIGUE E LIGUE A ENERGIA DO CICLO.
3. DESLIGUE E LIGUE A ENERGIA DO CICLO.
4. VERIFIQUE A FONTE DO PLC.
5. DESLIGUE E LIGUE A ENERGIA DO CICLO, SE OS PROBLEMAS NÃO FOREM SOLUCIONADOS SUBISTITUA O PLC.
6. VERIFIQUE AS CONEXÕES DE ACIONAMENTO E ACIONADORES.
7. DUAS CETRÍFUGAS CONECTADAS ENTRE SI (EM REDE). AS MÁQUINAS DEVEM SER SEPARADAS.

Figura 5-26 Indicadores PLC

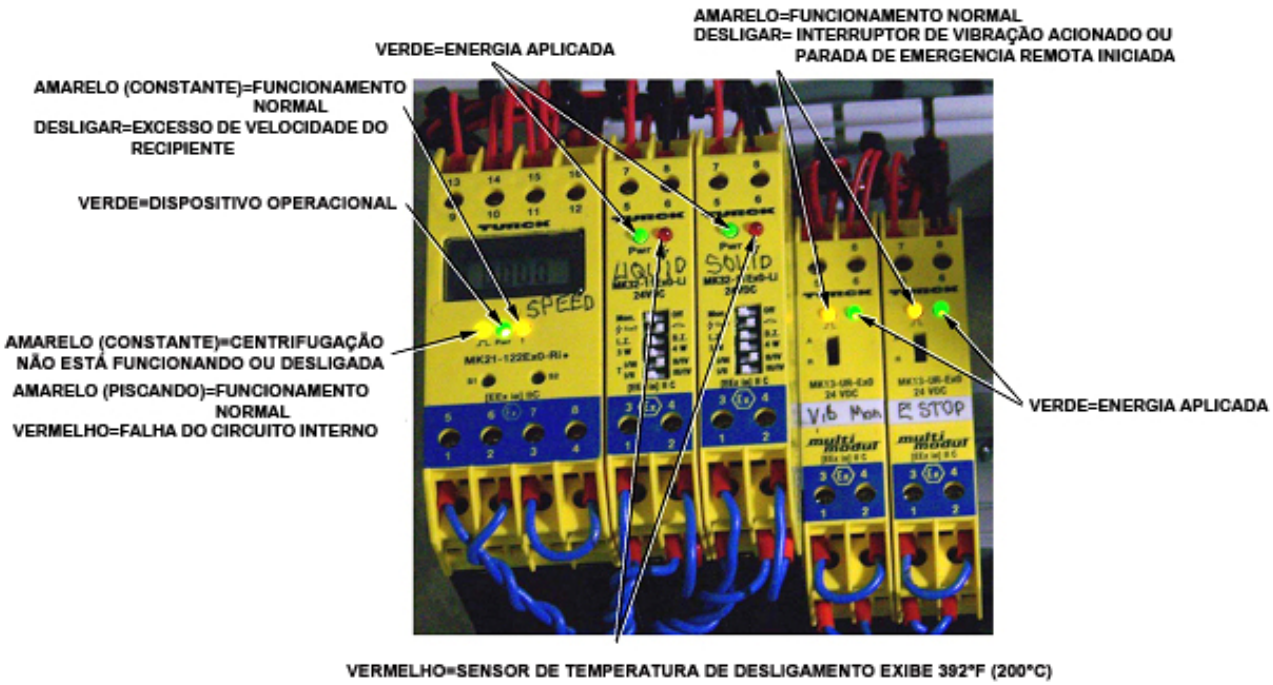

AMARELO=FUNCIONAMENTO NORMAL
DESLIGAR= INTERRUPTOR DE VIBRAÇÃO ACIONADO OU
PARADA DE EMERGENCIA REMOTA INICIADA
VERDE=ENERGIA APLICADA
AMARELO (CONSTANTE)=FUNCIONAMENTO NORMAL
DESLIGAR=EXCESSO DE VELOCIDADE DO RECIPIENTE
VERDE=DISPOSITIVO OPERACIONAL
AMARELO (CONSTANTE)=CENTRIFUGAÇÃO NÃO ESTÁ FUNCIONANDO OU DESLIGADA
AMARELO (PISCANDO)=FUNCIONAMENTO NORMAL
VERMELHO=FALHA DO CIRCUITO INTERNO
VERDE=ENERGIA APLICADA
VERMELHO=SENSOR DE TEMPERATURA DE DESLIGAMENTO EXIBE 392°F (200°C)

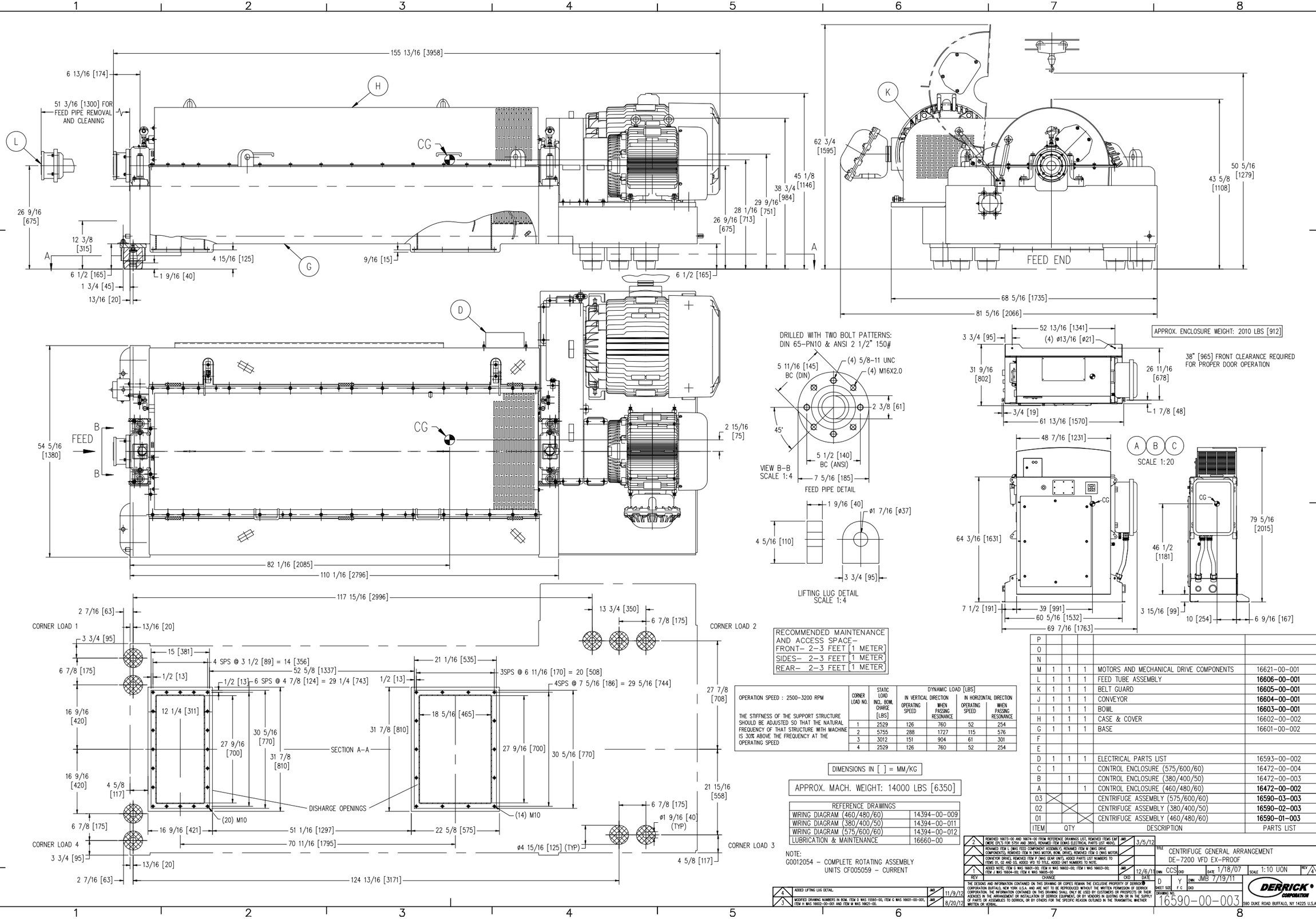
Figura 5-27 Indicadores de Transmissor/Barreira Intrínseca

Figura 5-28 Indicadores de Fonte de Energia

SEÇÃO 8 - DESENHOS DE REFERÊNCIA

Esta seção contém desenhos de engenharia Derrick para o seu equipamento. Estes desenhos são incluídos para fornecer assistência na solução de problemas, reparo e encomenda de peças.

Número	Título
16590-00-003	General Arrangement - XP Centrifuge
16590-00-004	General Arrangement - Non-XP Centrifuge
16601-00-001	Base Parts List
16602-00-001	Case and Cover Parts List
16603-00-001	Bowl Parts List
16604-00-001	Conveyor Parts List
16605-00-001	Belt Guard Parts List
14394-00-007	Electrical Wiring Schematic - 460/480V 60 Hz Non-XP Centrifuge
14394-00-009	Electrical Wiring Schematic - 460/480V 60 Hz XP Centrifuge
14394-00-011	Electrical Wiring Schematic – 380/400V 50Hz XP Centrifuge
14394-00-012	Electrical Wiring Schematic - 575/600V 60 Hz XP Centrifuge
14394-00-013	Electrical Wiring Schematic – 380/400V 50Hz Non-XP Centrifuge
16606-00-001	Feed Component Assembly
16618-00	Junction Box Assembly
16621-00	Drive Components Parts List
16593-00	Base Sensor System Parts List
16798-00	Repair Tool Kit
16607-00	XP Electrical Control Panel
16472-00-002	Control Enclosure Assembly, 460/480V 60 Hz XP Centrifuge
16472-00-003	Control Enclosure Assembly, 380/400V 50 Hz XP Centrifuge
16472-00-004	Control Enclosure Assembly, 575/600V 60 Hz XP Centrifuge
16472-00-005	Control Enclosure Assembly, 460/480V 60Hz Non XP Centrifuge



RECOMMENDED MAINTENANCE AND ACCESS SPACE-
FRONT- 2-3 FEET [1 METER]
SIDES- 2-3 FEET [1 METER]
REAR- 2-3 FEET [1 METER]

OPERATION SPEED : 2500-3200 RPM	CORNER LOAD NO.	STATIC LOAD INCL. BOWL CHARGE [LBS]	DYNAMIC LOAD [LBS] IN VERTICAL DIRECTION OPERATING SPEED	IN VERTICAL DIRECTION WHEN PASSING RESONANCE	IN HORIZONTAL DIRECTION OPERATING SPEED	IN HORIZONTAL DIRECTION WHEN PASSING RESONANCE
THE STIFFNESS OF THE SUPPORT STRUCTURE SHOULD BE ADJUSTED SO THAT THE NATURAL FREQUENCY OF THAT STRUCTURE WITH MACHINE IS 30% ABOVE THE FREQUENCY AT THE OPERATING SPEED	1	2529	126	760	52	254
	2	5755	288	1727	115	576
	3	3012	151	904	61	301
	4	2529	126	760	52	254

DIMENSIONS IN [ ] = MM/KG

APPROX. MACH. WEIGHT: 14000 LBS [6350]

REFERENCE DRAWINGS	
WIRING DIAGRAM (460/480/60)	14394-00-009
WIRING DIAGRAM (380/400/50)	14394-00-011
WIRING DIAGRAM (575/600/60)	14394-00-012
LUBRICATION & MAINTENANCE	16660-00

NOTE:
G0012054 - COMPLETE ROTATING ASSEMBLY
UNITS CF005059 - CURRENT

ITEM	QTY			DESCRIPTION	PARTS LIST
P					
O					
N					
M	1	1	1	MOTORS AND MECHANICAL DRIVE COMPONENTS	16621-00-001
L	1	1	1	FEED TUBE ASSEMBLY	**16606-00-001**
K	1	1	1	BELT GUARD	**16605-00-001**
J	1	1	1	CONVEYOR	**16604-00-001**
I	1	1	1	BOWL	**16603-00-001**
H	1	1	1	CASE & COVER	16602-00-002
G	1	1	1	BASE	16601-00-002
F					
E					
D	1	1	1	ELECTRICAL PARTS LIST	16593-00-002
C	1			CONTROL ENCLOSURE (575/600/60)	16472-00-004
B		1		CONTROL ENCLOSURE (380/400/50)	16472-00-003
A			1	CONTROL ENCLOSURE (460/480/60)	**16472-00-002**
03	X			CENTRIFUGE ASSEMBLY (575/600/60)	**16590-03-003**
02		X		CENTRIFUGE ASSEMBLY (380/400/50)	**16590-02-003**
01			X	CENTRIFUGE ASSEMBLY (460/480/60)	**16590-01-003**

REV.	CHANGE	CKD	DATE
4	ADDED LIFTING LUG DETAIL.	JMB	11/9/12
3	MODIFIED DRAWING NUMBERS IN BOM. ITEM D WAS 15593-00, ITEM G WAS 16601-00-001, ITEM H WAS 16602-00-005 AND ITEM M WAS 16621-00.	JMB	8/20/12
2	REMOVED 16673-00 AND 16674-00 FROM REFERENCE DRAWINGS LIST, REMOVED ITEMS EMT (MORE EPLTS FOR 575V AND 380V), RENAMED ITEM D(WAS ELECTRICAL PARTS LIST 460V).	JMB	3/5/12
	RENAMED ITEM L (WAS FEED COMPONENT ASSEMBLY), RENAMED ITEM M (WAS DRIVE COMPONENTS), REMOVED ITEM N (WAS MOTOR, BOWL DRIVE), REMOVED ITEM O (WAS MOTOR, CONVEYOR DRIVE), REMOVED ITEM P (WAS GEAR UNIT), ADDED PARTS LIST NUMBERS TO ITEMS 01, 02 AND 03, ADDED VFD TO TITLE, ADDED UNIT NUMBERS TO NOTE.		
1	ADDED NOTE: ITEM E WAS 16601-00, ITEM H WAS 16602-00, ITEM I WAS 16603-00; ITEM J WAS 16604-00, ITEM K WAS 16605-00	JMB	12/6/11

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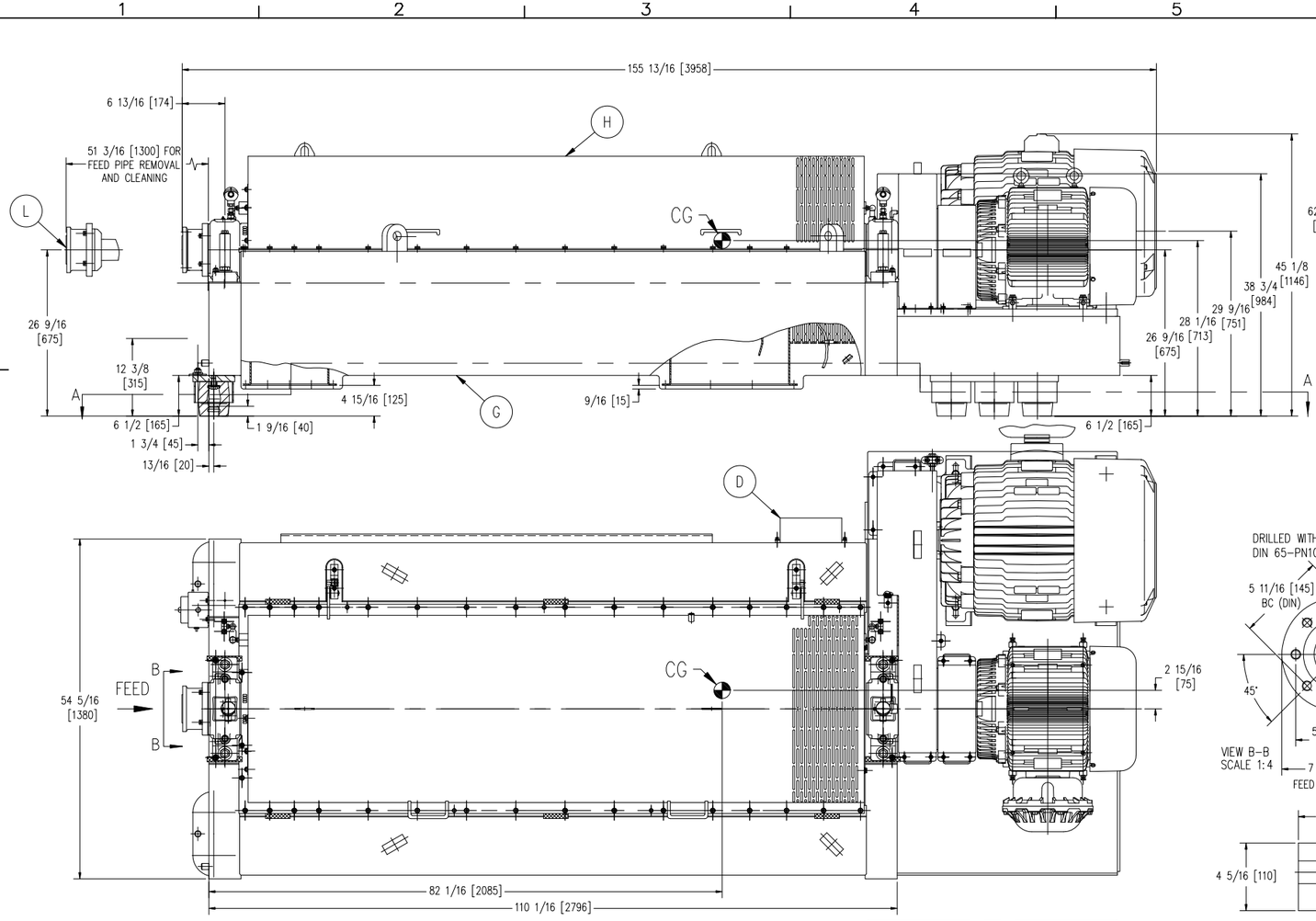
TITLE: CENTRIFUGE GENERAL ARRANGEMENT
DE-7200 VFD EX-PROOF

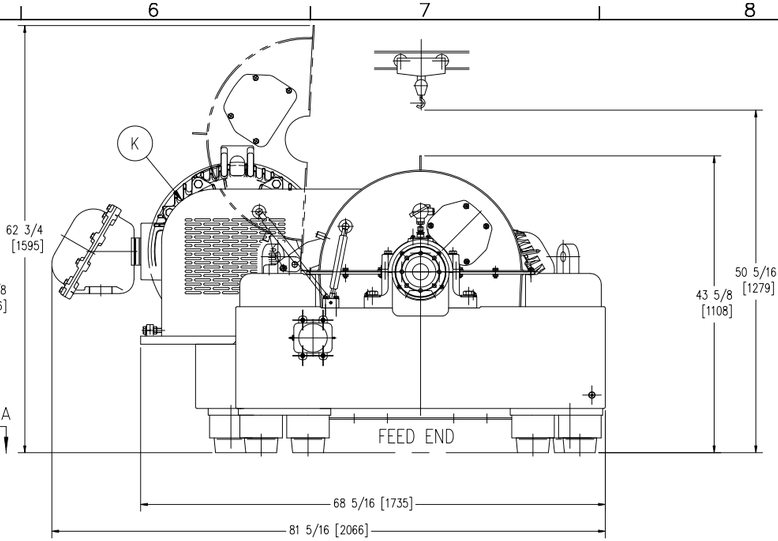
DWN	CCS	CKD	DATE	1/18/07	SCALE	1:10 UON	REV	4
DWN	JMB 7/19/11	CKD						

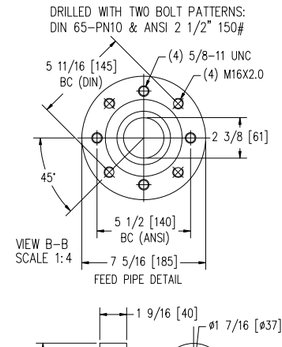
SHEET SIZE: D | F.C: Y
DRAWING NO. 16590-00-003

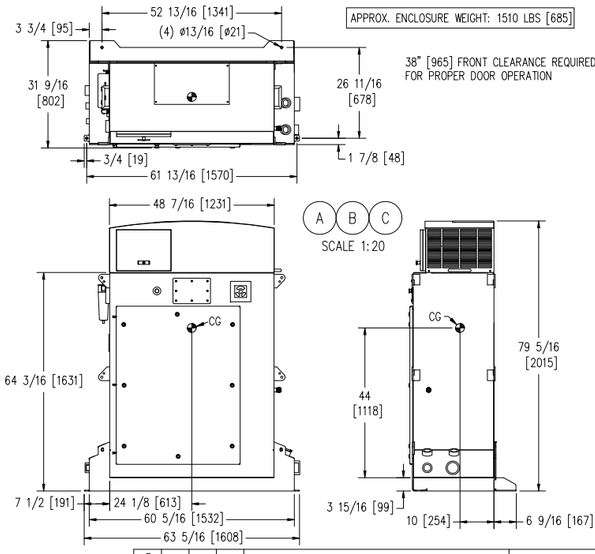
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

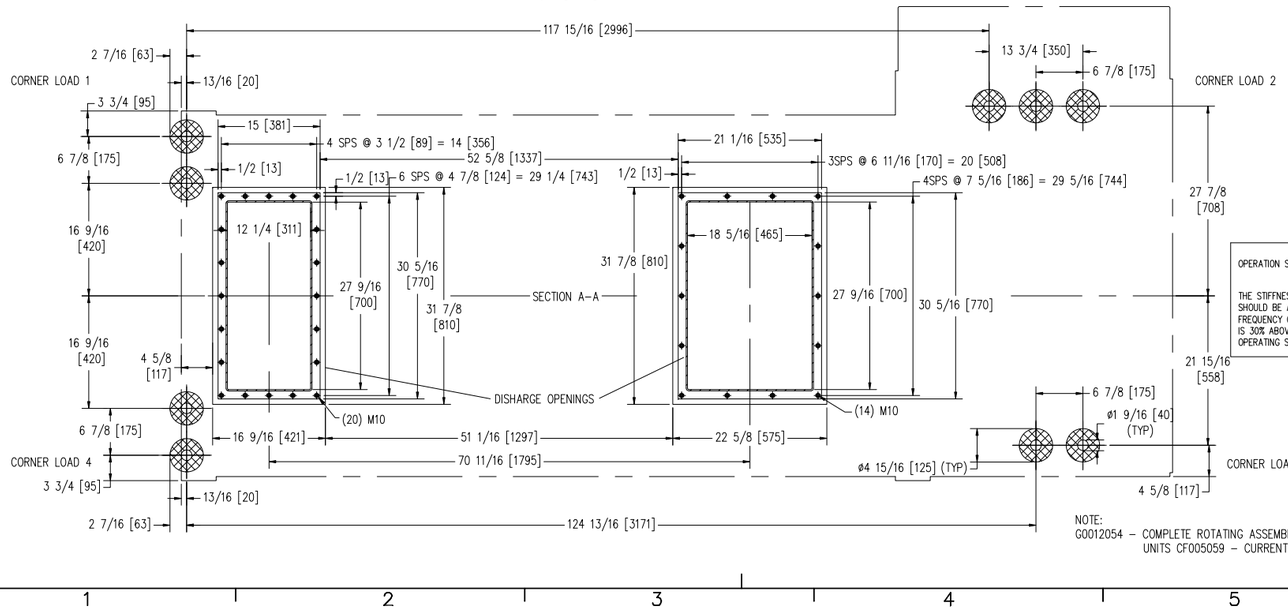
CO, WE, CENT, MAG, C-RM











RECOMMENDED MAINTENANCE AND ACCESS SPACE–
FRONT– 2–3 FEET [1 METER]
SIDES– 2–3 FEET [1 METER]
REAR– 2–3 FEET [1 METER]

OPERATION SPEED : 2500–3200 RPM

THE STIFFNESS OF THE SUPPORT STRUCTURE SHOULD BE ADJUSTED SO THAT THE NATURAL FREQUENCY OF THAT STRUCTURE WITH MACHINE IS 30% ABOVE THE FREQUENCY AT THE OPERATING SPEED

CORNER LOAD NO.	STATIC LOAD INCL. BOWL CHARGE [LBS]	DYNAMIC LOAD [LBS] IN VERTICAL DIRECTION – OPERATING SPEED	IN VERTICAL DIRECTION – WHEN PASSING RESONANCE	IN HORIZONTAL DIRECTION – OPERATING SPEED	IN HORIZONTAL DIRECTION – WHEN PASSING RESONANCE
1	2529	126	760	52	254
2	5755	288	1727	115	576
3	3012	151	904	61	301
4	2529	126	760	52	254

DIMENSIONS IN [ ] = MM/KG

APPROX. MACH. WEIGHT: 14000 LBS [6350]

REFERENCE DRAWINGS	
WIRING DIAGRAM (460/480/60)	14394–00–007
WIRING DIAGRAM (380/400/50)	14394–00–013
WIRING DIAGRAM (575/600/60)	14394–00–014
LUBRICATION & MAINTENANCE	16660–00

NOTE:
G0012054 – COMPLETE ROTATING ASSEMBLY
UNITS CF005059 – CURRENT

ITEM	QTY			DESCRIPTION	PARTS LIST
P					
O					
N					
M	1	1	1	MOTOR AND MECHANICAL DRIVE COMPONENTS	16621–00–001
L	1	1	1	FEED TUBE ASSEMBLY	**16606–00–001**
K	1	1	1	BELT GUARD	**16605–00–001**
J	1	1	1	CONVEYOR	**16604–00–001**
I	1	1	1	BOWL	**16603–00–001**
H	1	1	1	CASE & COVER	16602–00–002
G	1	1	1	BASE	16601–00–002
F					
E					
D	1	1	1	ELECTRICAL PARTS LIST	16593–00–002
C	1			CONTROL ENCLOSURE (575/600/60)	16472–00–007
B		1		CONTROL ENCLOSURE (380/400/50)	16472–00–006
A			1	CONTROL ENCLOSURE (460/480/60)	**16472–00–005**
03	X			CENTRIFUGE ASSEMBLY (575/600/60)	**16590–03–004**
02		X		CENTRIFUGE ASSEMBLY (380/400/50)	**16590–02–004**
01			X	CENTRIFUGE ASSEMBLY (460/480/60)	**16590–01–004**

REV	CHANGE	CKD	DATE
5	ADDED LIFTING LUG DETAIL.	AJB	11/9/12
4	MODIFIED DRAWING NUMBERS IN BOM. ITEM D WAS 16593–00, ITEM G WAS 16601–00–001, ITEM H WAS 16602–00–001, AND ITEM M WAS 16621–00.	AJB	8/20/12
3	REMOVED 16673–00 AND 16674–00 FROM REFERENCE DRAWINGS LIST, REMOVED ITEMS E&F (MDE EPL'S FOR 575V AND 380V), RENAMED ITEM D(WAS ELECTRICAL PARTS LIST 460V),	AJB	3/5/12
	RENAMED ITEM L (WAS FEED COMPONENT ASSEMBLY), RENAMED ITEM M (WAS DRIVE COMPONENTS), REMOVED ITEM N (WAS MOTOR, BOWL DRIVE), REMOVED ITEM O (WAS MOTOR,		
	CONVEYOR DRIVE), REMOVED ITEM P (WAS GEAR UNITS), ADDED PARTS LIST NUMBERS TO ITEMS D1, O2 AND O3, ADDED W/O TO TITLE, ADDED UNIT NUMBERS TO NOTE.		
2	ADDED NOTE: ITEM G WAS 16601–00, ITEM H WAS 16602–00, ITEM I WAS 16603–00; ITEM J WAS 16604–00, ITEM K WAS 16605–00	AJB	12/6/11
1	UPDATED VIEW OF CONTROL ENCLOSURE, COG, WEIGHT WAS 2010 LBS	EJR	11/14/11

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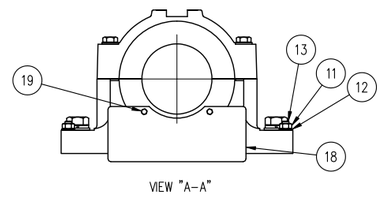
TITLE: CENTRIFUGE GENERAL ARRANGEMENT
DE–7200 VFD NON EX–PROOF

DWN CCS | CKD | DATE 1/18/07 | SCALE 1:10 UON | REV 5
SHEET SIZE D | F.C. Y | DWN EJR 8/25/11 | CKD
DRAWING NO. 16590–00–004

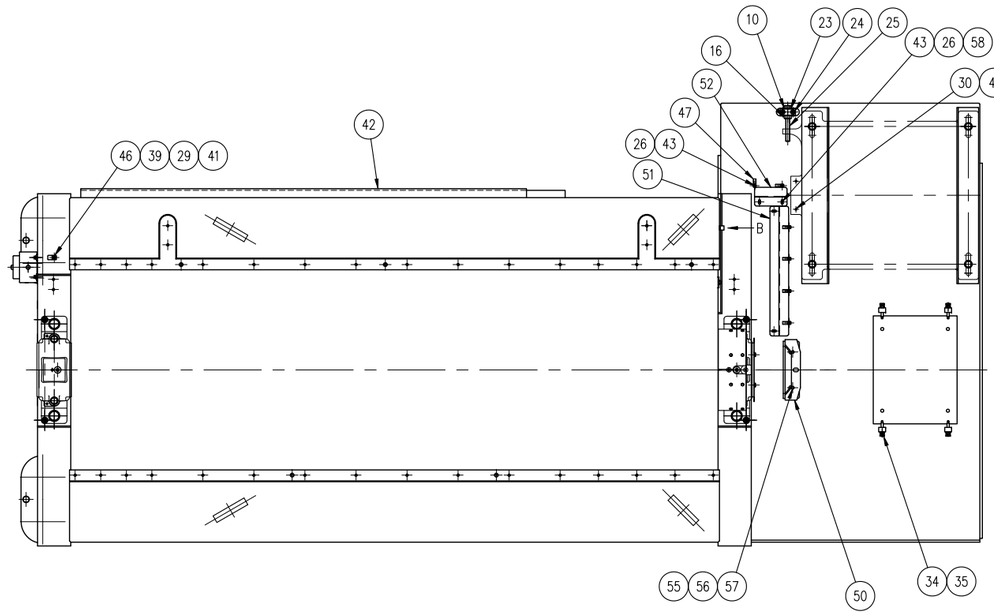
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

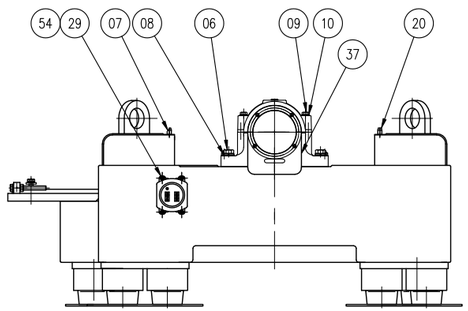
LTD, ME, CENT, MANC, C–RM

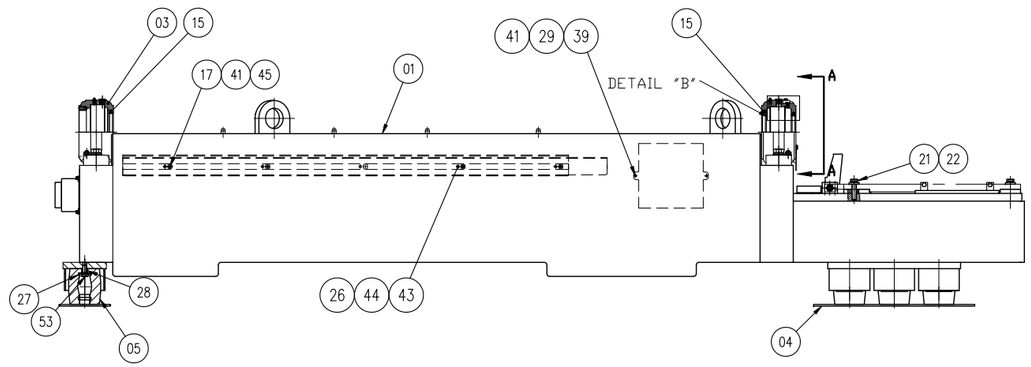
ITEM	DESCRIPTION	TORQUE SETTING (Nm)
06	M24-3.0 X 80mm	680 [501.5 FT-LBS]
09	M16-2.0 X 100mm	195 [143.8 FT-LBS]

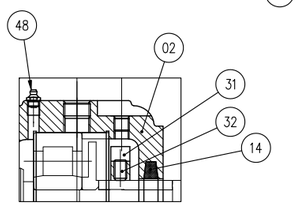


VIEW "A-A"

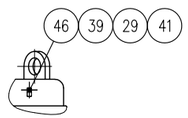








DETAIL "B"



VIEW "B"

			ITEM	PART NUMBER	DESCRIPTION/PART NAME
5	2		58	WFSS-25	FLAT WASHER
	2		57	WLSS-M12	LOCK WASHER
	2		56	G0012777	FLAT WASHER
	2		55	G0012127	HEX HEAD BOLT
5	4		54	G0007748	HEX HEAD BOLT
4		9	53	G0007745	HEX HEAD BOLT
3	1		52	17103-01	SPEED SENSOR CABLE GAURD
3	1		51	17103-01-001	SPEED SENSOR CABLE GAURD
3	1		50	17089-01-001	SPEED SENSOR BRACKET
2		X	49	G0012590	BASE ASSEMBLY
2	2		48	G0007887	GREASE FITTING
2 1	6		47	PP1074-CLIP	FASTENING CLAMP
1	2		46	G0008177	FASTENING CLAMP
	5		45	WFSS-38-SAE	FLAT WASHER
	5		44	G0007743	WASHER
	5		43	G0007907	SOCKET HEAD SCREW
	1		42	16554-01-001	CABLE TRAY ASSEMBLY
2 1	15		41	G0007910	LOCK WASHER
4					
2 1	10		39	G0007909	SOCKET HEAD SCREW
2			38		
2		1	37	17495-01	GREASE DEFLECTOR LIQUID END
2			36		
		4	35	G0007766	HEX NUT
		4	34	G0012401	ADJUSTING SCREW
4			33		
		3	32	G0007755	SET SCREW
		1	31	G0007754	CAM RING
5	3		30	G0007756	HEX HEAD BOLT
4 3 1	22		29	G0007750	FLAT WASHER
4 2		9	28	G0007747	BUSHING
4 2		9	27	G0007746	FLANGE
	5		26	G0008101	LOCK WASHER
		1	25	G0007737	HEX HEAD BOLT
5		2	24	G0007736	SOCKET HEAD SCREW
		1	23	G0007735	TENSION BLOCK
		4	22	G0012400	LOCK WASHER
		4	21	G0007733	HEX HEAD BOLT
		2	20	G0007739	LOCATING PIN
		2	19	G0007731	HEX HEAD BOLT
		1	18	G0012547	GREASE DEFLECTOR SOLID END
5	5		17	G0007908	SOCKET HEAD SCREW
		1	16	G0007793	HEX NUT
		2	15	G0007727	FELT STRIP
		1	14	G0007726	FELT STRIP
		4	13	G0007725	TAPER PIN
		4	12	G0007724	FLAT WASHER
		4	11	G0007723	HEX NUT
		5	10	G0007722	FLAT WASHER
		4	09	G0007721	HEX HEAD BOLT
		4	08	G0012399	LOCK WASHER
		3	07	G0007753	LOCATING PIN
		4	06	G0007718	HEX HEAD BOLT
		9	05	G0007717	VIBRATION ISOLATOR
		1	04	**17279-01**	MOUNTING PLATE ASSY
		1	03	G0012373	PILLOW BLOCK, LIQUID END
		1	02	G0012372	PILLOW BLOCK, SOLID END
		1	01	G0012442	BASE FRAME

REF GA: 16590-00-003
REF GA: 16590-00-004
REF GA: 16590-00-005
REF GA: 16590-00-006

NOTE:
USED WITH UNITS CF005059 - CF005113

REV	CHANGE		DATE
5	ADDED ITEMS 54-58. CHANGED PART NUMBER OF ITEM 17 (WAS G0007908). CHANGED QUANTITY OF ITEM 30 (WAS 4). PER DRR # 3027.	JMB	10/29/12
4	MADE NEW COLUMN FOR ALL PARTS THAT DERRICK PUTS ON MACHINE. REMOVED ITEMS 33 (WAS G0007781) AND 40 (WAS DUPLICATE OF ITEM 29). CHANGED QTY OF 29 (WAS 20). ADDED VIEW "B". ADDED ITEMS 27,28 AND 53.	JMB	8/17/12
3	ADDED ITEMS 50-52.	JMB	7/18/12
2	REMOVED ITEMS 27 (WAS G0007746), 28 (WAS G0007747), 36 (WAS G0007884) AND 38 (WAS 16593-03). CHANGED QTY OF ITEMS 29 (WAS 8), 39 (WAS 4) AND 41 (WAS 9).	JMB SB	3/26/12
	CHANGED ITEMS 37 (WAS G0012432) AND 47 (WAS G0008027), ADDED ITEMS 48 AND 49.		
1	ADDED ITEMS 46 & 47; ITEM 29, QTY WAS 4; ITEM 39 QTY WAS 2; ITEM 41, QTY WAS 7.	JMB CKD	2/13/12 DATE

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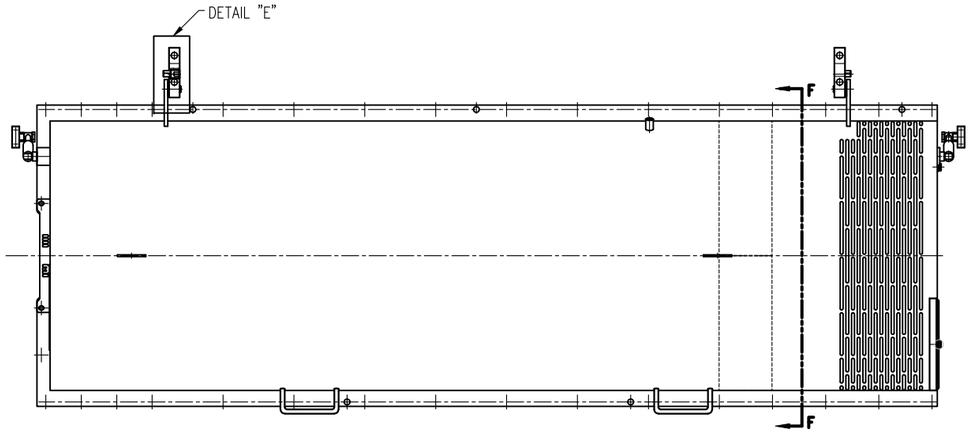
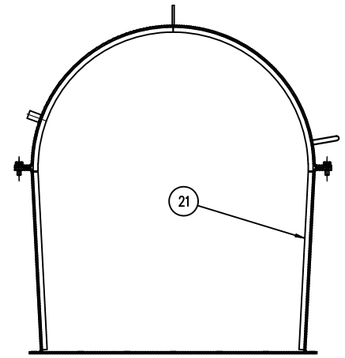
TITLE: BASE PARTS LIST
DE-7200 CENTRIFUGE

DWN CCS CKD DATE 1/19/07 SCALE NTS REV 5
C Y DWN JMB 12/12/11 CKD
SHEET SIZE F C
DRAWING NO. 16601-00-001

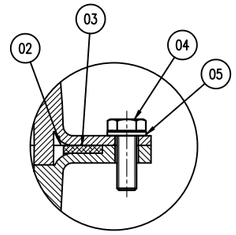
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN, C-RM

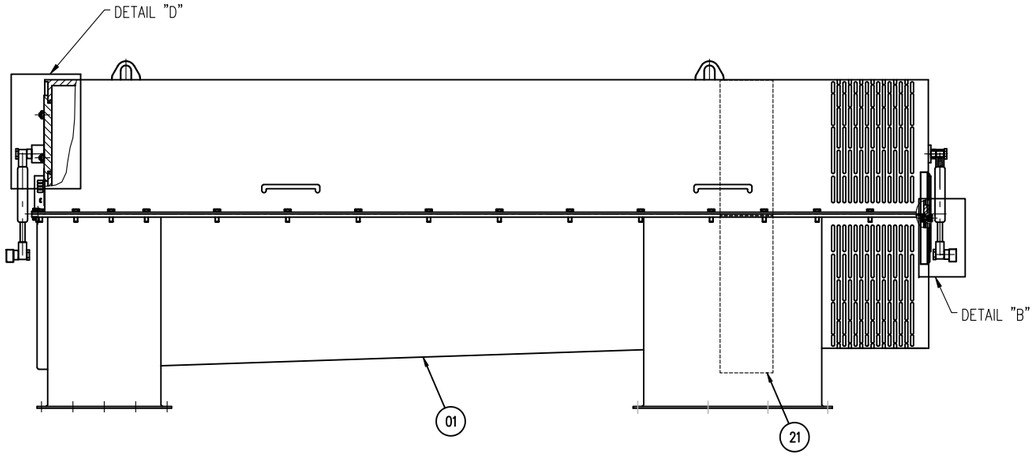


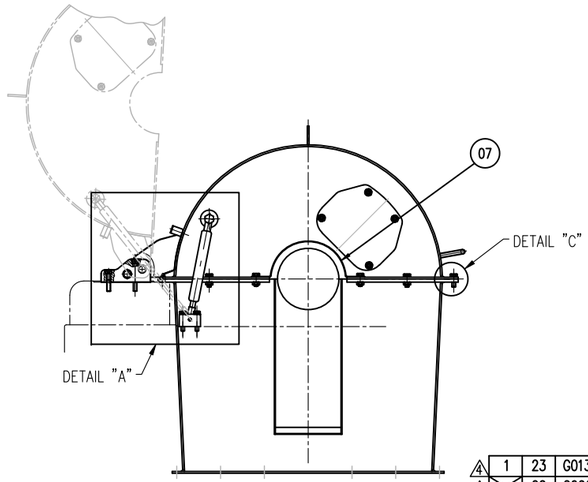


SECTIONAL VIEW "F"



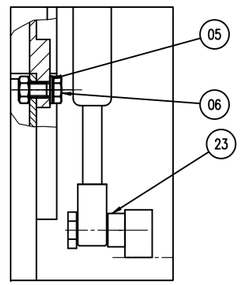
DETAIL "C"

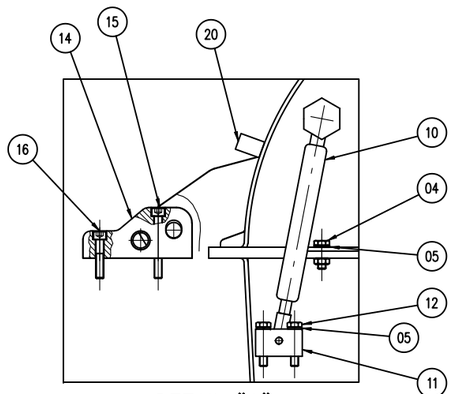




4	1	23	G013590	MOUNTING PIN KIT
1	X	22	G0012511	CASE ASSEMBLY COMPLETE
	1	21	16995-01	WEAR PLATES
	1	20	G0007777	PIPE PLUG
1		19		
	4	18	G0007775	FLAT WASHER
	2	17	G0007774	STOP PIN
	2	16	G0007773	SOCKET HEAD SCREW
	2	15	G0007772	SOCKET HEAD SCREW
	2	14	G0007771	HINGE BRACKET
1		13		
	4	12	G0007769	HEX HEAD BOLT
2 1	2	11	G0007768	CYLINDER MOUNT
	2	10	G0007767	GAS CYLINDER
	4	09	G0007766	HEX NUT
1	1	08	G0012512	COVER
	1	07	G0007764	SHAFT GAURD
	2	06	G0007763	HEX HEAD BOLT
1	46	05	G0007729	FLAT WASHER
	36	04	G0007761	HEX HEAD BOLT
3	1	03	16929-01	CASE SEAL
	1	02	G0007759	SEAL TAPE
	1	01	G0012222	CASE
QTY	ITEM	PART NUMBER		DESCRIPTION/PART NAME

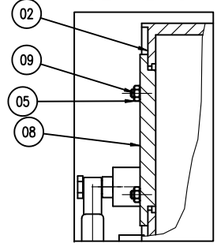
DETAIL "B"





DETAIL "A"

DETAIL "D"



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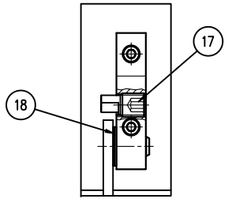

REF: 16590-00-003
REF: 16590-00-004
REF: 16590-00-005
REF: 16590-00-006

NOTE:
USE FOR UNITS CF0050591-CF005113

REV	CHANGE	CKD	DATE
2	MODIFIED ITEM 11 (WAS G0012513)	JMB	5/16/12
1	REMOVED ITEMS 13 (WAS G0007770) AND 19 (WAS G0007776). CHANGED ITEMS 08 (WAS G0007765) AND 11 (WAS G0007768). CHANGED QTY OF ITEM 05 (WAS 42).	JMB SB	3/26/12
	ADDED ITEM 22		
4	ADDED ITEM 23. UPDATED VIEWS	JMB	4/9/13
3	CHANGED QTY OF ITEM 03 (WAS 4).	JMB	8/30/12

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TITLE: CASE & COVER PARTS LIST
DE-7200 CENTRIFUGE

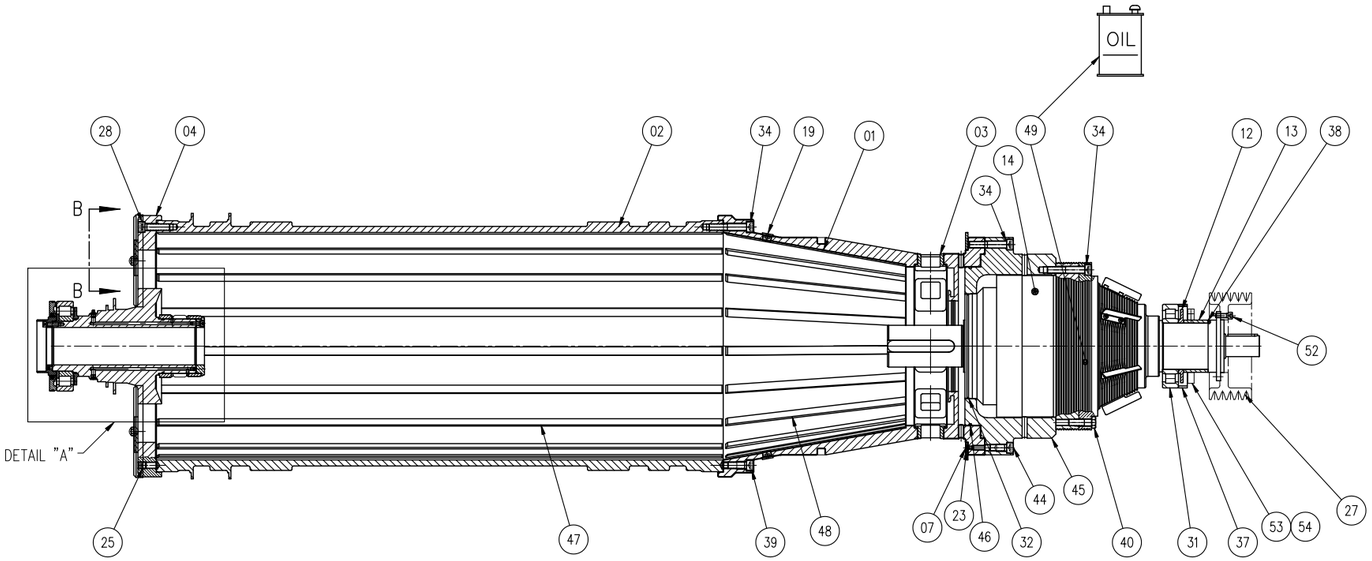
DWN CCS | CKD | DATE 1/23/07 | SCALE NTS | REV 4

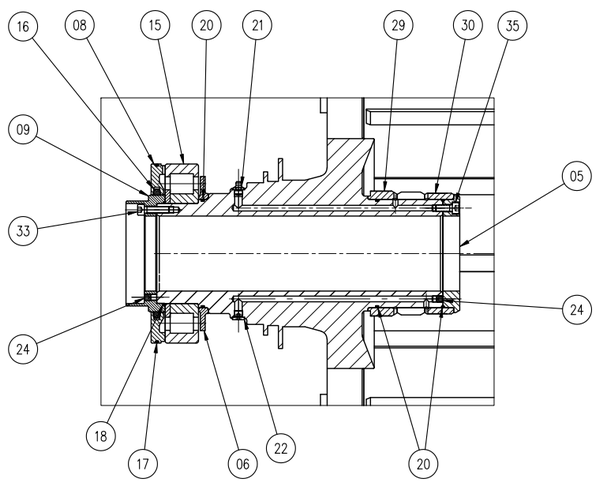
SHEET SIZE C | Y | DWN JMB 12/13/11 | CKD

DRAWING NO. 16602-00-001

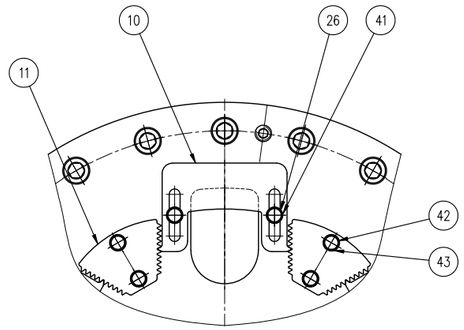
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN





DETAIL "A"



SECTION B-B

ITEM	DESCRIPTION	TORQUE SPEC (Nm)
07	M8-1.25 X 16mm	21.6 [15.9 FT-LBS]
28	M16-2.0 X 60mm	183.3 [135.2 FT-LBS]
33	M8-1.25 X 30mm	21.6 [15.9 FT-LBS]
34	M16-2.0 X 90mm	136.5 [100.7 FT-LBS]
35	M8-1.25 X 20mm	21.6 [15.9 FT-LBS]
39	M16-2.0 X 45mm	183.3 [135.2 FT-LBS]
40	M16-2.0 X 55mm	136.5 [100.7 FT-LBS]
42	M8-1.25 X 20mm	16.1 [11.9 FT-LBS]

	QTY		ITEM	PART NUMBER	DESCRIPTION/PART NAME
3,2	3	3	54	G0007755	SET SCREW
3,2	1	1	53	G0007754	CAM RING
2		4	52	G0007873	SOCKET HEAD SCREW
2,1			51	G0012484	BOWL ASSEMBLY
2			50		
	1	1	49	G0008986	GEAR OIL
3		18	48	17595-02	BOWL EXTENSION STRIPS
3,1		18	47	17595-01	BOWL STRIP
	1	1	46	G0012431	O-RING
	1	1	45	G0012223	GEAR BOX ADAPTER
	4	4	44	G0012411	SOCKET HEAD SCREW
2	12	12	43	G0007750	FLAT WASHER
	12	12	42	G0007833	HEX HEAD BOLT
	12	12	41	G0007729	FLAT WASHER
	4	4	40	G0012407	HEX HEAD BOLT
	4	4	39	G0007830	SOCKET HEAD SCREW
	1	1	38	G0007829	O-RING
	1	1	37	G0007828	SPACER RING
2			36		
	6	6	35	G0007826	SOCKET HEAD SCREW
	60	60	34	G0007825	SOCKET HEAD SCREW
	6	6	33	G0007824	SOCKET HEAD SCREW
	1	1	32	G0007823	O-RING, GEAR BOX
	1	1	31	G0007822	ROLLER BEARING, SOLID END
	1	1	30	G0007821	SEALING RING
	1	1	29	G0007820	SEALING RING
	24	24	28	G0007819	SOCKET HEAD SCREW
2		1	27	G0012485	V-BELT PULLEY
	12	12	26	G0007763	HEX HEAD BOLT
	4	4	25	G0007818	SET SCREW
	6	6	24	G0007817	SET SCREW
2	2	2	23	17408-01	WEAR RING
	1	1	22	G0007815	PIPE PLUG
	1	1	21	G0007814	LUBRICATION NIPPLE
	3	3	20	G0007813	O-RING, LIQUID END
	2	2	19	G0012412	SCREW PLUG
	1	1	18	G0007811	O-RING, CLAMPING RING-PILLOW
	1	1	17	G0007810	PACKING SEAL, LIQUID END
	1	1	16	G0007809	FELT RING
	1	1	15	G0007808	ROLLER BEARING, LIQUID END
	1	1	14	G0012299	GEAR BOX
	1	1	13	G0007806	SPACER RING
	1	1	12	G0012406	GREASE RING
4	6	6	11	17152-01-001	WEIR GUAGE PLATE
	6	6	10	G0007803	WEIR PLATE
	1	1	09	G0007802	CLAMPING RING, PILLOW BLOCK
	1	1	08	G0007801	RETAINING WASHER
	10	10	07	G0012413	COUNTERSUNK BOLT
	1	1	06	G0007799	FLINGER
	1	1	05	G0007798	THRUST WASHER
	1	1	04	G0012404	BOWL HEAD, LIQUID END
	8	8	03	G0007796	WEAR INSERT, SOLID DISCHARGE
	1	1	02	G0012403	CYLINDRICAL BOWL
	1	1	01	G0012402	CONICAL BOWL

REF: 16590-00-003

NOTE:
FOR USE WITH UNITS CF005059 - CURRENT

REV	CHANGE	CKD	DATE
5	IN TORQUE SPEC TABLE, ITEM 28: M16 WAS M4 (TYPO)	EJR	9/20/12
4	ITEM 11 - 17152-01-001 WAS G0012405, CHANGE PER DRR 3020	JHM / JTF	9/18/12
3	CHANGED QUANTITIES OF ITEMS 47 (WAS *) AND 48 (WAS *). ADDED QUANTITIES TO ASSEMBLY 51 COLUMN FOR ITEMS 53&54.	JMB	8/9/12
2	REMOVED ITEMS 36 (WAS G0007827) AND 50 (WAS G0008169), CHANGED ITEMS 23 (WAS 17408-01), 27 (WAS G0007959), ADDED ITEMS 52, 53 AND 54,	JMB	3/22/12
1	ADDED PART NUMBER TO ITEM 51.		
	ADDED ITEMS 49, 50 AND 51, ADDED PART NUMBERS FOR ITEMS 47 AND 48	JMB	2/22/12

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TITLE: BOWL PARTS LIST
DE-7200 CENTRIFUGE

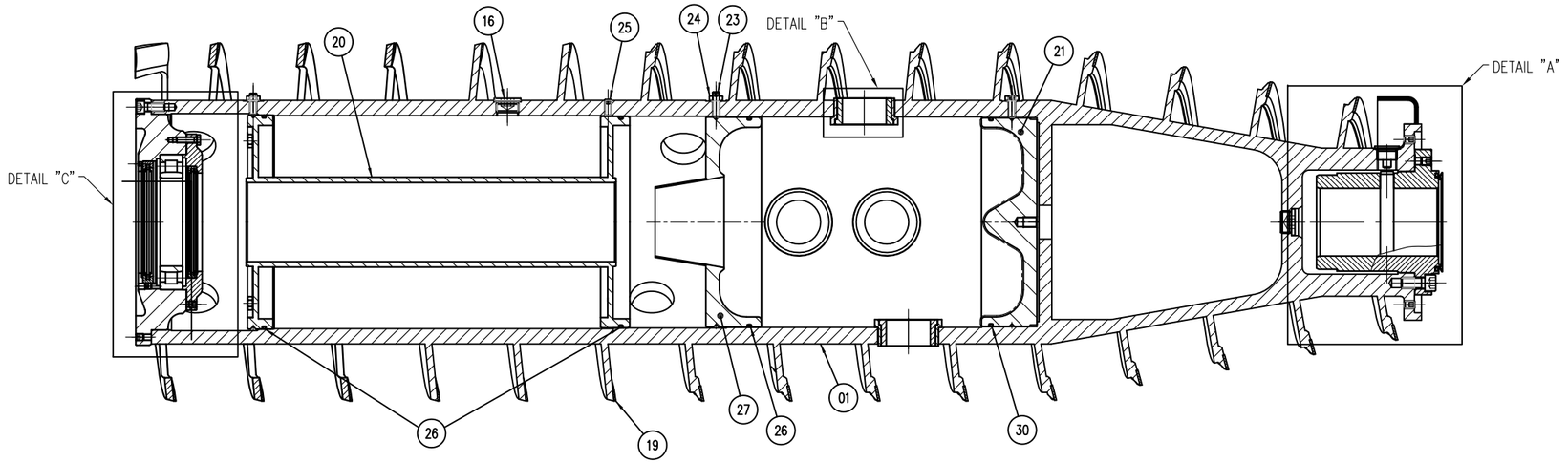
DWN CCS | CKD | DATE 1/31/07 | SCALE NTS | REV 5

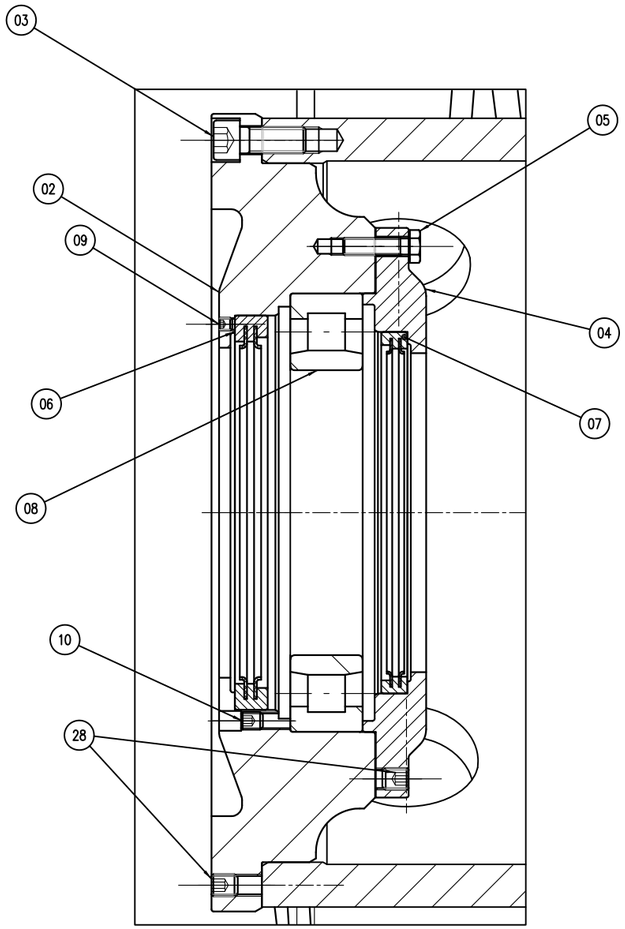
SHEET SIZE C | F Y | DWN JMB 12/7/11 | CKD

DRAWING NO. 16603-00-001

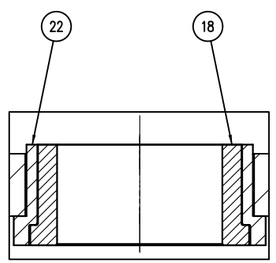
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN, C-RM





DETAIL "C"



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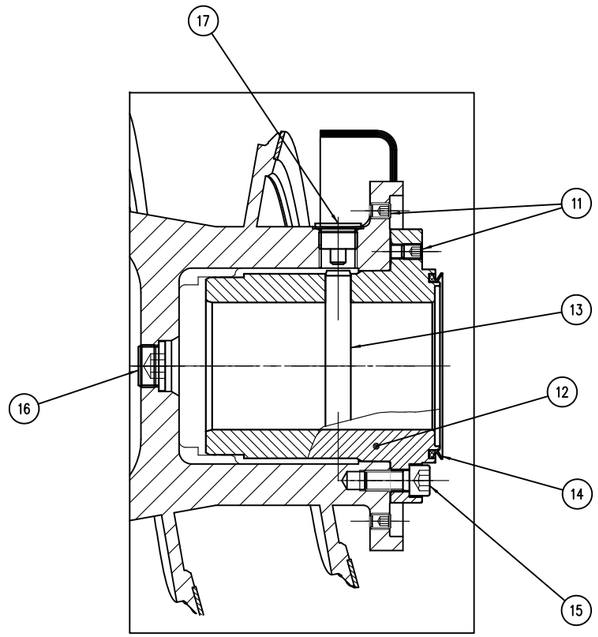

DETAIL "A"

ITEM	DESCRIPTION	TORQUE SETTING (Nm)
03	M12-1.75 X 30mm	74.3 [54.8 FT-LBS]
05	M8-1.25 X 30mm	16.1 [11.9 FT-LBS]
15	M16-2.0 X 35mm	183.3 [135.2 FT-LBS]

	QTY	ITEM	PART NUMBER	DESCRIPTION/PART NAME
2	1	30	G0012500	O-RING
3 1	X	29	G0012505	CONVEYOR ASSEMBLY COMPLETE
	4	28	G0007878	SET SCREW
	1	27	G0012433	FEED ACCELERATOR REAR
2	3	26	G0012260	O-RING
	3	25	G0012259	SET SCREW
	9	24	G0007766	HEX NUT
	9	23	G0012258	SET SCREW
	6	22	G0012257	FEED NOZZLE SLEEVE
	1	21	G0012256	FEED ACCELERATOR FRONT
	1	20	G0012255	PIPE PROTECTOR
1	420	19	G0012254	TILE & BACKING PLATE
1	6	18	G0012498	FEED NOZZLE
	2	17	G0007885	PIPE PLUG
	3	16	G0012261	PIPE PLUG
	12	15	G0007884	SOCKET HEAD SCREW
	1	14	G0007883	LIP SEAL
	1	13	G0007882	DOWEL PIN
	1	12	G0007881	DRIVE SLEEVE
	8	11	G0007880	SET SCREW
	2	10	G0007879	SET SCREW
	1	09	G0012262	SET SCREW
	1	08	G0007877	ROLLER BEARING
	1	07	G0007876	SHAFT SEAL
	1	06	G0007875	SHAFT SEAL
	8	05	G0012253	HEX HEAD BOLT
	1	04	G0012252	SEAL COVER
	8	03	G0012251	SOCKET HEAD SCREW
2 1	1	02	G0012497	BEARING HOUSING
	1	01	G0012224	CONVEYOR

NOTE:
USE PARTS LIST ON UNITS CF005059 - CURRENT

REF GA: 16590-00-003
REF GA: 16590-00-004
REF GA: 16590-00-005
REF GA: 16590-00-006

REV	CHANGE	CKD	DATE
3	CHANGED ITEM 29 (WAS G0012445)	JMB	8/30/12
2	ADDED ITEM 30, CORRECTED PART NUMBER FOR ITEM 02, ADDED NOTE FOR UNIT NUMBERS, CHANGED QTY OF ITEM 26 (WAS 4)	JMB SB	3/22/12
1	ITEM 02, ADDED PART NUMBER; ITEM 18 WAS G0012417, ADDED ITEM 29, CHANGED QTY AND PART # ON ITEM 19 (WAS 475 - G0008483).	JMB	2/3/12

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TITLE: CONVEYOR PARTS LIST
DE-7200 CENTRIFUGE

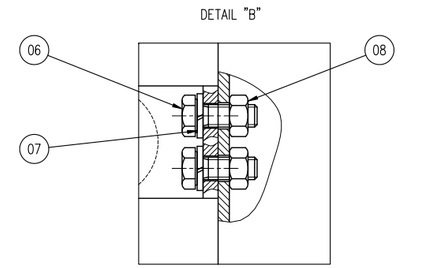
DWN CCS | CKD | DATE 2/1/07 | SCALE NTS | REV 3

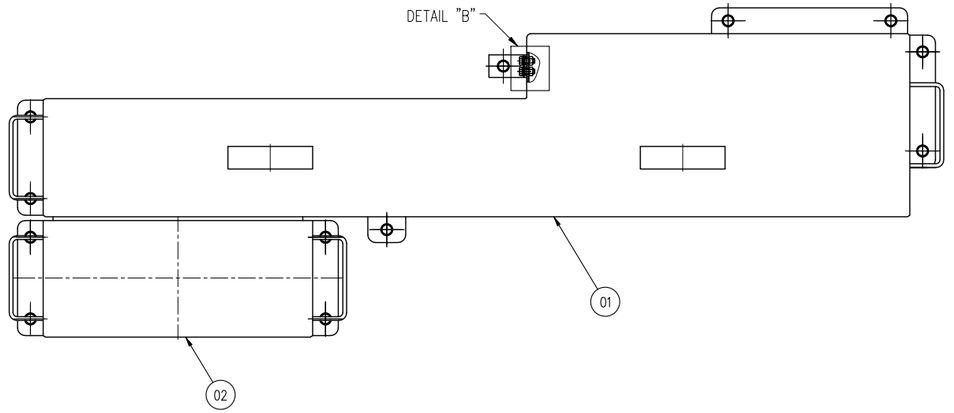
SHEET SIZE C | F C | Y | DWN JMB 12/7/11 | CKD

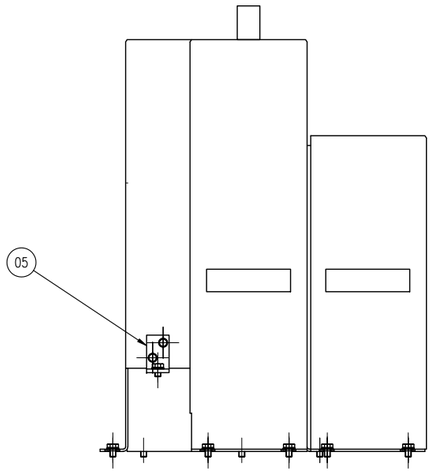
DRAWING NO. 16604-00-001

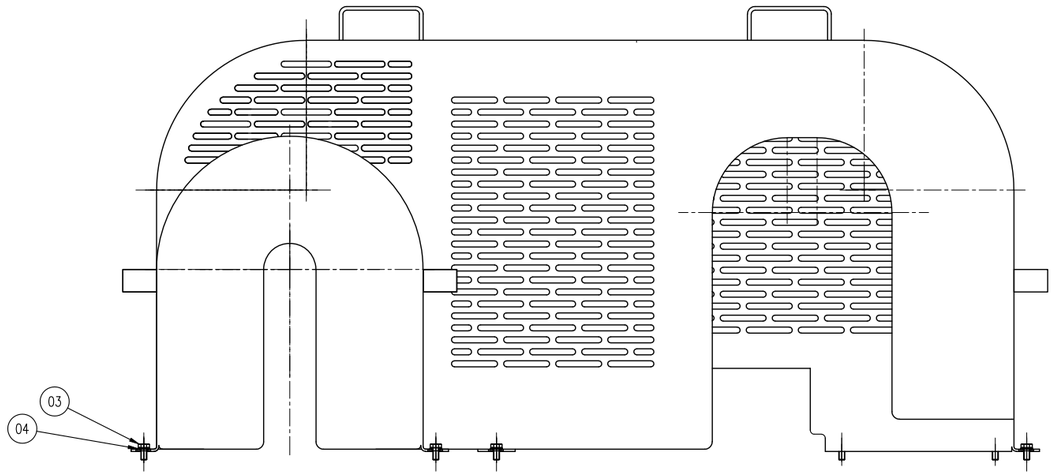
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN









		QTY	ITEM	PART NUMBER	DESCRIPTION/PART NAME
1		09	G0012504		BELT GAURD ASSEMBLY
		2	08	G0007860	HEX NUT
2		2	07	G0008101	LOCK WASHER
		2	06	G0012416	HEX HEAD BOLT
		1	05	G0007857	MOUNTING ANGLE
1		12	04	G0012501	FLAT WASHER
		12	03	G0007756	HEX HEAD BOLT
		1	02	G0012415	SHAFT GUARD
1		1	01	G0012414	BELT GUARD

REF GA: 16590-00-003
REF GA: 16590-00-004
REF GA: 16590-00-005
REF GA: 16590-00-006

NOTE:
USE WITH UNITS CF005036 - CURRENT

REV	CHANGE	CKD	DATE
2	CHANGED ITEM 07 (WAS G0007859)	JMB	4/25/12
1	ITEM 01, ADDED PART NUMBER; ITEM 04, CHANGED PART NUMBER TO G0012501, WAS G0007850; ADDED ITEM 09; UPDATED BALLOONS	JMB SB	2/13/12

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TITLE: BELT GUARD PARTS LIST
DE-7200 CENTRIFUGE

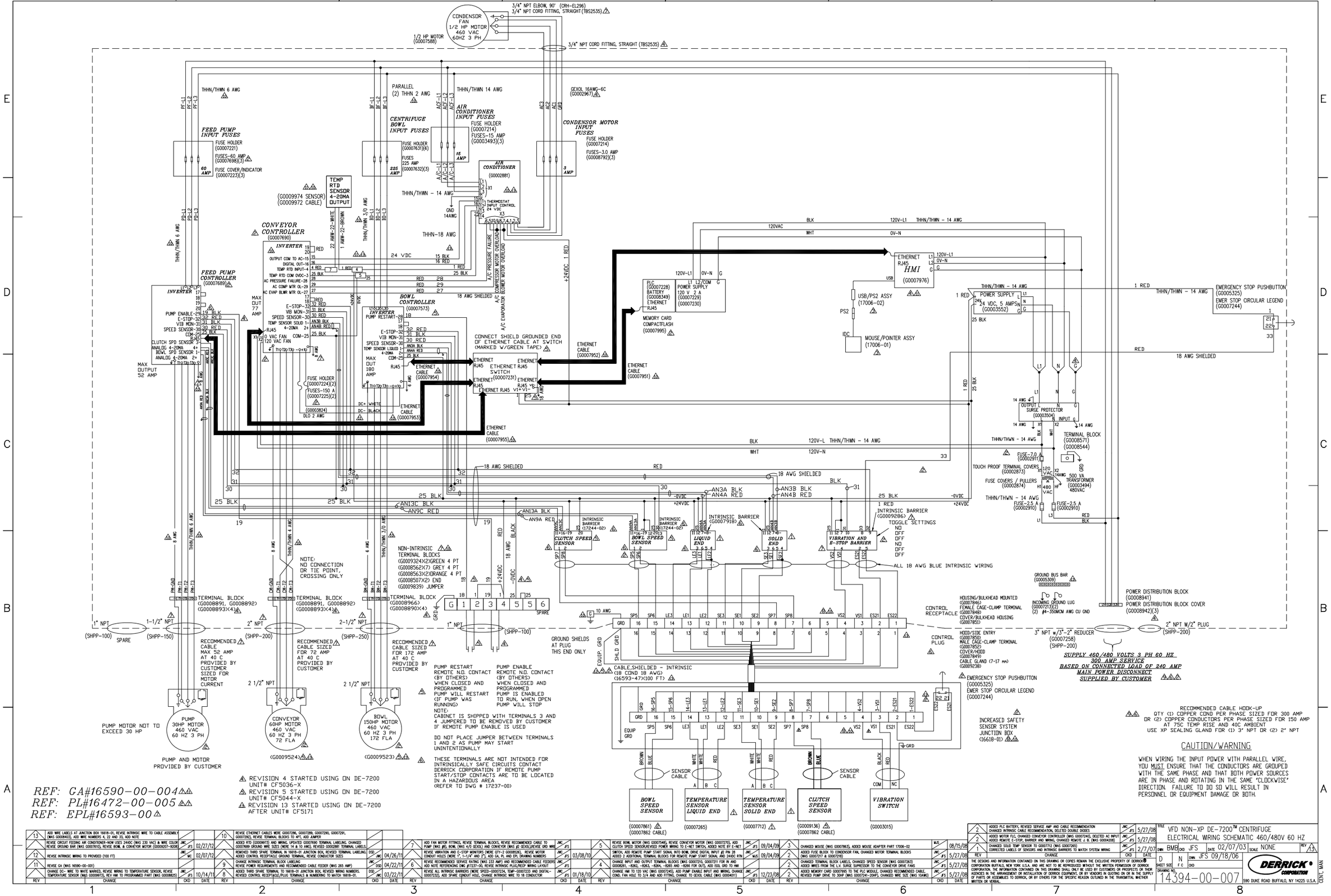
DWN CCS | CKD | DATE 1/31/07 | SCALE NTS | REV 2

C | Y | DWN JMB 12/7/11 | F C | CKD

SHEET SIZE | DRAWING NO. 16605-00-001

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN


CONDENSOR FAN 1/2 HP MOTOR 460 VAC 60HZ 3 PH
1/2 HP MOTOR (G0007588)
3/4" NPT ELBOW, 90° (CRH-EL296)
3/4" NPT CORD FITTING, STRAIGHT (TBS2535)
3/4" NPT CORD FITTING, STRAIGHT (TBS2535)
GEXOL 16AWG-6C (G0002967)
FEED PUMP INPUT FUSES
FUSE HOLDER (G0007221)
FUSES-60 AMP (G0007698)(3)
FUSE COVER/INDICATOR (G0007223)(3)
60 AMP
CENTRIFUGE BOWL INPUT FUSES
FUSE HOLDER (G0007631)(6)
FUSES 225 AMP (G0007632)(3)
225 AMP
AIR CONDITIONER INPUT FUSES
FUSE HOLDER (G0007214)
FUSES-15 AMP (G0003493)(3)
15 AMP
CONDENSOR MOTOR INPUT FUSES
FUSE HOLDER (G0007214)
FUSES-3.0 AMP (G0008792)(3)
3 AMP
AIR CONDITIONER (G0002881)
THERMOSTAT INPUT CONTROL 24 VDC
TEMP RTD SENSOR 4-20MA OUTPUT
(G0009974 SENSOR) (G0009972 CABLE)
CONVEYOR CONTROLLER (G0007690)
INVERTER
FEED PUMP CONTROLLER (G0007689)
BOWL CONTROLLER (G0007573)
PARALLEL (2) THHN 2 AWG
THHN/THWN 14 AWG
THHN/THWN 6 AWG
THHN/THWN 3/0 AWG
THHN/THWN – 14 AWG
THHN-18 AWG
24 VDC
+24VDC
-0VDC
+240DC
PLC (G0007228) BATTERY (G0008349) ETHERNET RJ45
POWER SUPPLY 120 V 2 A (G0007229) (G0007230)
MEMORY CARD COMPACTFLASH (G0007995)
ETHERNET RJ45 HMI (G0007976)
USB/PS2 ASSY (17006-02)
MOUSE/POINTER ASSY (17006-01)
POWER SUPPLY 24 VDC, 5 AMPS (G0003552)
EMERGENCY STOP PUSHBUTTON (G0005325) EMER STOP CIRCULAR LEGEND (G0007244)
ETHERNET RJ45 SWITCH (G0007231)
ETHERNET CABLE (G0007951)
ETHERNET CABLE (G0007952)
ETHERNET CABLE (G0007953)
ETHERNET CABLE (G0007954)
ETHERNET CABLE (G0007955)
CONNECT SHIELD GROUNDED END OF ETHERNET CABLE AT SWITCH (MARKED W/GREEN TAPE)
120 VAC FAN
FUSE HOLDER (G0007224)(2)
FUSES-150 A (G0007225)(2)
(G0003824) DLO 2 AWG
MAX OUTPUT 52 AMP
MAX OUT 77 AMP
MAX OUT 180 AMP
OUTPUT L SURGE PROTECTOR (G0003504) N INPUT G
TERMINAL BLOCK (G0008571) (G0008544)
FUSE-7.0 A (G0002911)
TOUCH PROOF TERMINAL COVERS (G0002873)
FUSE COVERS / PULLERS (G0002874)
TRANSFORMER (G0003494) 480VAC
FUSE-2.5 A (G0002910)
THHN/THWN – 14 AWG
INTRINSIC BARRIER (G0009286)
TOGGLE SETTINGS
ALL 18 AWG BLUE INTRINSIC WIRING
INTRINSIC BARRIER (G0007918)
INTRINSIC BARRIER (17244-02)
CLUTCH SPEED SENSOR
BOWL SPEED SENSOR
LIQUID END
SOLID END
VIBRATION AND E-STOP BARRIER
NON-INTRINSIC TERMINAL BLOCKS (G0009324)(2)GREEN 4 PT (G0008562)(7) GREY 4 PT (G0008563)(2)ORANGE 4 PT (G0008507)(2) END (G0009839) JUMPER
TERMINAL BLOCK (G0008891, G0008892)
TERMINAL BLOCK (G0008893)(4)
TERMINAL BLOCK (G0008966) (G0008890)(4)
NOTE: NO CONNECTION OR TIE POINT, CROSSING ONLY
GROUND BUS BAR (G0005309)
INCOMING GROUND LUG (G0007233)(2) (2) #4-350MCM AWG CU GND
POWER DISTRIBUTION BLOCK (G0008941) POWER DISTRIBUTION BLOCK COVER (G0008942)(3)
CONTROL RECEPTACLE
HOUSING/BULKHEAD MOUNTED (G0007846) FEMALE CAGE-CLAMP TERMINAL (G0007848) COVER/BULKHEAD HOUSING (G0007850)
CONTROL PLUG
HOOD/SIDE ENTRY (G0007850) MALE CAGE-CLAMP TERMINAL (G0007852) COVER/HOOD (G0007849) CABLE GLAND (7-17 mm) (G0009238)
EMERGENCY STOP PUSHBUTTON (G0005325) EMER STOP CIRCULAR LEGEND (G0007244)
INCREASED SAFETY SENSOR SYSTEM JUNCTION BOX (16618-01)
CABLE,SHIELDED – INTRINSIC (18 COND 18 AWG) (16593-47)(100 FT)
GROUND SHIELDS AT PLUG THIS END ONLY
3" NPT W/3"-2" REDUCER (G0007258) (SHPP-200)
2" NPT W/2" PLUG (SHPP-200)
SUPPLY 460/480 VOLTS 3 PH 60 HZ 300 AMP SERVICE BASED ON CONNECTED LOAD OF 240 AMP MAIN POWER DISCONNECT SUPPLIED BY CUSTOMER
RECOMMENDED CABLE HOOK-UP QTY (1) COPPER COND PER PHASE SIZED FOR 300 AMP OR (2) COPPER CONDUCTORS PER PHASE SIZED FOR 150 AMP AT 75C TEMP RISE AND 40C AMBIENT USE XP SEALING GLAND FOR (1) 3" NPT OR (2) 2" NPT
CAUTION/WARNING
WHEN WIRING THE INPUT POWER WITH PARALLEL WIRE, YOU MUST ENSURE THAT THE CONDUCTORS ARE GROUPED WITH THE SAME PHASE AND THAT BOTH POWER SOURCES ARE IN PHASE AND ROTATING IN THE SAME 'CLOCKWISE' DIRECTION. FAILURE TO DO SO WILL RESULT IN PERSONNEL OR EQUIPMENT DAMAGE OR BOTH.
RECOMMENDED CABLE SIZED FOR 72 AMP AT 40 C PROVIDED BY CUSTOMER
RECOMMENDED CABLE SIZED FOR 172 AMP AT 40 C PROVIDED BY CUSTOMER
RECOMMENDED CABLE MAX 52 AMP AT 40 C PROVIDED BY CUSTOMER SIZED FOR MOTOR CURRENT
PUMP MOTOR NOT TO EXCEED 30 HP
PUMP 30HP MOTOR 460 VAC 60 HZ 3 PH
CONVEYOR 60HP MOTOR 460 VAC 60 HZ 3 PH 72 FLA
BOWL 150HP MOTOR 460 VAC 60 HZ 3 PH 172 FLA
(G0009524)
(G0009523)
PUMP AND MOTOR PROVIDED BY CUSTOMER
PUMP RESTART REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP WILL RESTART (IF PUMP WAS RUNNING)
PUMP ENABLE REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP IS ENABLED TO RUN, WHEN OPEN PUMP WILL STOP
NOTE: CABINET IS SHIPPED WITH TERMINALS 3 AND 4 JUMPERED TO BE REMOVED BY CUSTOMER IF REMOTE PUMP ENABLE IS USED
DO NOT PLACE JUMPER BETWEEN TERMINALS 1 AND 2 AS PUMP MAY START UNINTENTIONALLY
THESE TERMINALS ARE NOT INTENDED FOR INTRINSICALLY SAFE CIRCUITS CONTACT DERRICK CORPORATION IF REMOTE PUMP START/STOP CONTACTS ARE TO BE LOCATED IN A HAZARDOUS AREA (REFER TO DWG # 17237-00)
REVISION 4 STARTED USING ON DE-7200 UNIT# CF5036-X
REVISION 5 STARTED USING ON DE-7200 UNIT# CF5044-X
REVISION 13 STARTED USING ON DE-7200 AFTER UNIT# CF5171
REF: CA#16590-00-004
REF: PL#16472-00-005
REF: EPL#16593-00
SENSOR CABLE
BOWL SPEED SENSOR (G0007861) (G0007862 CABLE)
TEMPERATURE SENSOR LIQUID END (G0007265)
TEMPERATURE SENSOR SOLID END (G0007712)
CLUTCH SPEED SENSOR (G0009136) (G0007862 CABLE)
VIBRATION SWITCH (G0003015)

REV	CHANGE	CKD	DATE
13	ADD WIRE LABELS AT JUNCTION BOX 16618-01, REVISE INTRINSIC WIRE TO CABLE ASSEMBLY (WAS G0008403), ADD WIRE NUMBERS 4, 22 AND 33, ADD NOTE.	JMC	
	REVISE CIRCUIT FEEDING AIR CONDITIONER–NOW USES 240C (WAS 230 VAC) & WIRE COLOR REVISE GROUND BAR (WAS G0007610), REVISE BOWL & CONVEYOR MOTOR (G0009207–9208)	JMC JFS	02/27/12
12	REVISE INTRINSIC WIRING TO PROVIDED (100 FT)	JMC MC	02/07/12
11	REVISE GA (WAS 16590–00–001)	JMC	
	CHANGE DC– WIRE TO WHITE MARKED, REVISE WIRING TO TEMPERATURE SENSOR, REVISE TEMPERATURE SENSOR (WAS G0009972), REV HMI TO PROGRAMMED PART (WAS G0008625)	JMC JFS	10/14/11
10	REVISE ETHERNET CABLES WERE G0007286, G0007289, G0007290, G0007291, G0007292), REVISE TERMINAL BLOCKS TO 4PT, ADD JUMPER		
	ADDED RTD (G0009972) AND WIRING, UPDATED G0007690 TERMINAL LABELING. CHANGED G0007689 GROUND WIRE SIZES (WERE 14 & 10 AWG), REVISED G0002881 TERMINAL LABELS.		
9	REMOVED THIRD SPARE TERMINAL IN 16618–01 JUNCTION BOX, REVISED TERMINAL LABELING. ADDED CONTROL RECEPTACLE GROUND TERMINAL, REVISE CONDUCTOR SIZES	DSD	04/26/11
	CHANGE INTRINSIC TERMINAL BLOCK LABELING REVISE POWER REQUIREMENTS AND RECOMMENDED CABLE FEEDER (WAS 265 AMP)	JMC DSD	04/22/11
8	ADDED THIRD SPARE TERMINAL TO 16618–01 JUNCTION BOX, REVISED WIRING NUMBERS. REVISED CONTROL RECEPTACLE/PLUG TERMINALS & NUMBERING TO MATCH 16618–01.	DSD JMC	03/22/11
7	ADD FAN MOTOR RTTINGS, REVISE TERMINAL BLOCKS, REVISE RECOMMENDED CABLE TO PUMP (WAS #5), BOWL (WAS 4/0 CEXCL), AND CONVEYOR (WAS #2 CEXCL)REVISE GRD WIRE	JMC JFS	01/18/10
6	REVISE VIBRATION AND E–STOP MONITORS (WERE QTY–2 G0009526), REVISE MOTOR CONDUIT HOLES (WERE 1", 1–1/4" AND 2"), ADD GA, PL AND EPL DRAWING NUMBERS	JMC JFS	03/08/10
	REVISE RECOMMENDED SERVICE RATING (WAS 233 AMP) AND RECOMMENDED CABLE FEEDERS ADD NOTE REFERENCING DWG #17237–00, REVISE INTRINSIC PLUG/RECEP WIRING LAYOUT	JMC JFS	
5	REVISE ALL INTRINSIC BARRIERS (WERE SPEED–G0007234, TEMP–G0007233 AND DIGITAL–G0007232), ADD SPARE CONDUIT HOLE, CHANGE INTRINSIC WIRE TO 18 CONDUCTOR	JMC JFS	01/18/10
4	REVISE BOWL MOTOR (WAS G0007548), REVISE CONVEYOR MOTOR (WAS G0007270), ADD CLUTCH SPEED SENSOR,REVISED POWER WIRING TO E–NET SWITCH, ADDED NOTE BY E–NET	JMC JFS	09/04/09
	SWITCH, ADD REMOTE PUMP START SIGNAL INTO BOWL DRIVE DIGITAL INPUT #3 PIN 29 ADDED 2 ADDITIONAL TERMINAL BLOCKS FOR REMOTE PUMP START SIGNAL AND 24VDC RTN	JMC MJS	09/04/09
	CHANGE INPUT AND OUTPUT TERMINAL BLOCKS (WAS G0007210, G0007211 FOR IN AND G0003051, –52&3, –53&3, –53&4, –52&4, –1265 AND –1266 FOR OUT), ADD 0DL GRD TO HMI	JMC JFS	
3	CHANGE HMI TO 120 VAC (WAS G0007245), ADD PUMP ENABLE INPUT AND WIRING, CHANGE CONV. FAN HUE TO 3/4 AND ADD FITTING, CHANGE TO GEXOL CABLE (WAS G0004011)	JMC JFS	12/23/08
	CHANGED MOUSE (WAS G0007863), ADDED MOUSE ADAPTER PART 17006–02	JMC JFS	08/15/08
2	ADDED FUSE BLOCK TO CONDENSOR FAN, CHANGED TERMINAL BLOCKS (WAS G0007217 & G0007218)	JMC JFS	5/27/08
	ADDED WIRES FROM THE L.V. SURGE SUPRESSOR TO THE CONVETOR DRIVE FANS	JMC JFS	5/27/08
	CHANGED TERMINAL BLOCK LABELS, CHANGED SPEED SENSOR (WAS G0007263)	JMC JFS	5/27/08
	ADDED MEMORY CARD G0007995 TO THE PLC MODULE, CHANGED RECOMMENDED CABLE.	JMC JFS	5/27/08
2	REVISED PUMP DRIVE TO 30HP (WAS G0007241–20HP), CHANGED WIRE SIZE (WAS 10AWG)	JMC JFS	5/27/08
2	ADDED PLC BATTERY, REVISED SERVICE AMP AND CABLE RECOMMENDATION	JMC JFS	5/27/08
	CHANGED INTRINSIC CABLE RECOMMENDATION, DELETED DOUBLE DIODES		
2	ADDED MOTOR PLC CHANGED CONVEYOR CONTROLLER (WAS G0007240), DELETED AC INPUT	JMC JFS	5/27/08
	ADDED REMOTE E–STOP, BARRIER AND WIRING, CHANGED REMOTE J. B. (WAS G0004208)		
1	CHANGED SOLID TEMP SENSOR TO G0007712 (WAS G0007265)	JMC JFS	2/7/07
	CORRECTED LABELS OF SENSORS AND INTRINSIC BARRIERS TO MATCH SYSTEM WIRING		
REV	CHANGE	CKD	DATE

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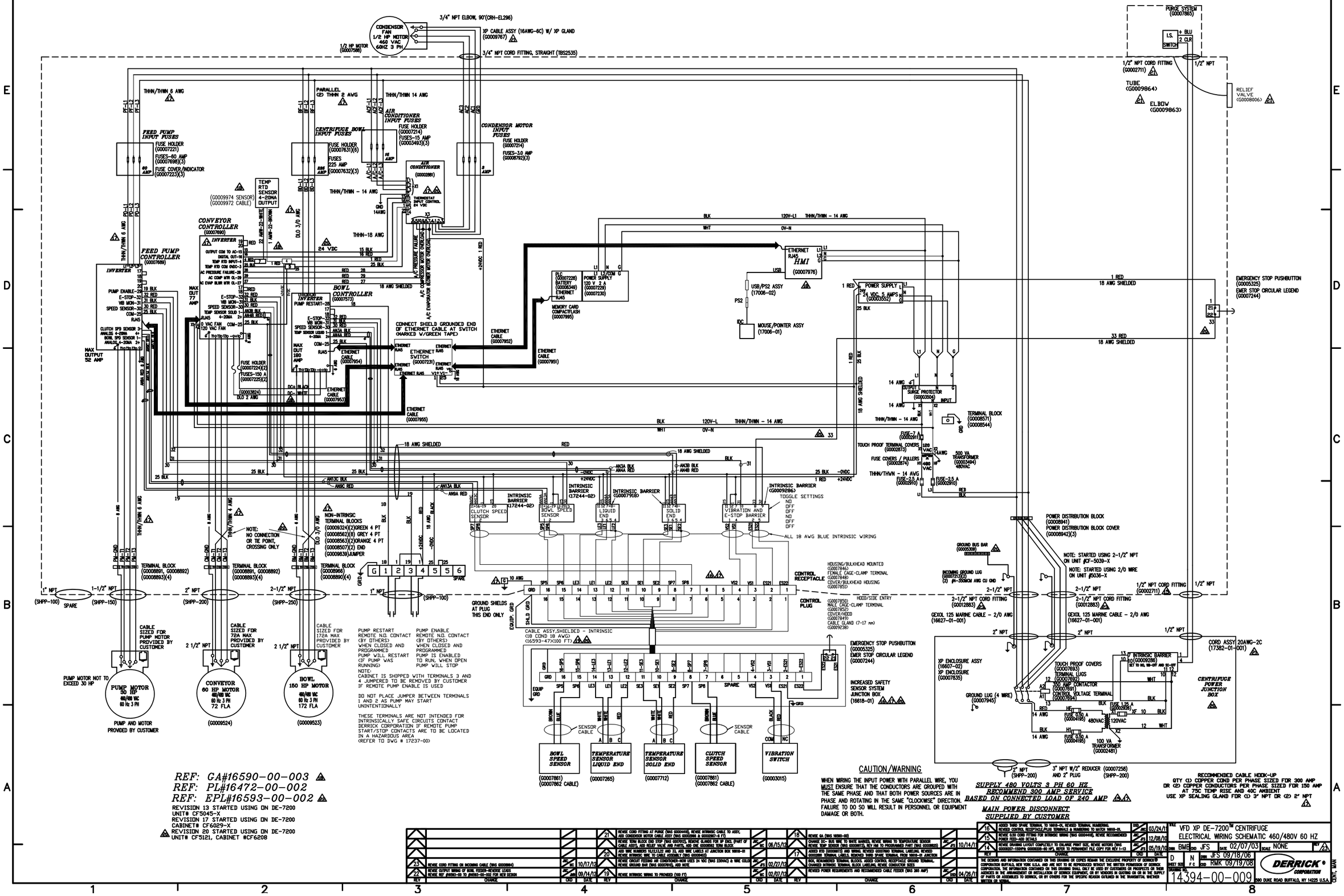
TITLE: VFD NON-XP DE-7200™ CENTRIFUGE
ELECTRICAL WIRING SCHEMATIC 460/480V 60 HZ

DWN	DATE	SCALE	REV
BMB	02/07/03	NONE	13

CKD: JFS
DWN: JFS 09/18/06
SHEET SIZE: D
F.C.: N
DRAWING NO.: 14394-00-007

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN


CONDENSOR FAN 1/2 HP MOTOR 460 VAC 60HZ 3 PH
1/2 HP MOTOR (G0007588)
3/4" NPT ELBOW, 90°(CRH-EL296)
XP CABLE ASSY (16AWG-6C) W/ XP GLAND (G0009767)
3/4" NPT CORD FITTING, STRAIGHT (TBS2535)
PURGE SYSTEM (G0007885)
L.S. SWITCH
+ BLU
2 CLR
1/2" NPT CORD FITTING (G0002711)
1/2" NPT
TUBE (G0009864)
ELBOW (G0009863)
RELIEF VALVE (G0008006)
FEED PUMP INPUT FUSES
FUSE HOLDER (G0007221)
FUSES-60 AMP (G0007695)(3)
FUSE COVER/INDICATOR (G0007223)(5)
60 AMP
CENTRIFUGE BOWL INPUT FUSES
FUSE HOLDER (G0007631)(6)
FUSES 225 AMP (G0007632)(3)
225 AMP
AIR CONDITIONER INPUT FUSES
FUSE HOLDER (G0007214)
FUSES-15 AMP (G0003493)(3)
15 AMP
CONDENSOR MOTOR INPUT FUSES
FUSE HOLDER (G0007214)
FUSES-3.0 AMP (G0008792)(3)
3 AMP
AIR CONDITIONER (G0002881)
THERMOSTAT INPUT CONTROL 24 VDC
TEMP RTD SENSOR 4-20MA OUTPUT
(G0009974 SENSOR) (G0009972 CABLE)
CONVEYOR CONTROLLER (G0007690)
INVERTER
FEED PUMP CONTROLLER (G0007689)
INVERTER
BOWL CONTROLLER (G0007573)
INVERTER
THHN/THWN 6 AWG
THHN/THWN 14 AWG
THHN/THWN – 14 AWG
THHN–18 AWG
PARALLEL (2) THHN 2 AVG
22 AWG–2C–BROWN
DLO 3/0 AWG
24 VDC
18 AWG SHIELDED
A/C PRESSURE FAILURE
A/C COMPRESSOR MOTOR OVERLOAD
A/C EVAPORATOR BLOWER MOTOR OVERLOAD
+VAC: 1 RED
MAX OUT 77 AMP
MAX OUTPUT 52 AMP
MAX OUT 180 AMP
PUMP ENABLE
E-STOP
VB MON
SPEED SENSOR
COM
RJ45
CLUTCH SPD SENSOR 4–20MA
BOWL SPD SENSOR 4–20MA
ANALOG 4–20MA
10 VAC FAN
120 VAC FAN
FUSE HOLDER (G0007224)(2)
FUSES–150 A (G0007225)(2)
(G0003824) DLO 2 AWG
DC+ BLACK
DC– WHITE
PUMP RESTART
CONNECT SHIELD GROUNDED END OF ETHERNET CABLE AT SWITCH (MARKED W/GREEN TAPE)
ETHERNET SWITCH (G0007231)
ETHERNET CABLE (G0007954)
ETHERNET CABLE (G0007953)
ETHERNET CABLE (G0007955)
ETHERNET CABLE (G0007952)
ETHERNET CABLE (G0007951)
PLC (G0007228) BATTERY (G0008349) ETHERNET RJ45
POWER SUPPLY 120 V 2 A (G0007228) (G0007230)
MEMORY CARD COMPACTFLASH (G0007995)
ETHERNET RJ45 HMI (G0007976)
USB/PS2 ASSY (17006–02)
MOUSE/POINTER ASSY (17006–01)
POWER SUPPLY 24 VDC 5 AMPS (G0003552)
BLK 120V–L1 THHN/THWN – 14 AWG
WHT 0V–N
1 RED 18 AWG SHIELDED
33 RED 18 AWG SHIELDED
EMERGENCY STOP PUSHBUTTON (G0005325)
EMER STOP CIRCULAR LEGEND (G0007244)
OUTPUT SURGE PROTECTOR (G0003504)
INPUT
14 AWG
TERMINAL BLOCK (G0008571) (G0008544)
FUSE–7 A (G0002911)
TOUCH PROOF TERMINAL COVERS (G0002873)
FUSE COVERS / PULLERS (G0002874)
THHN/THVN – 14 AWG
FUSE–2.5 A (G0002910)
500 VA TRANSFORMER (G0003494) 480VAC
-0VDC
+24VDC
INTRINSIC BARRIER (17244–02)
INTRINSIC BARRIER (G0007918)
INTRINSIC BARRIER (G0009886)
TOGGLE SETTINGS
NO OFF
NO OFF
NO OFF
NO OFF
CLUTCH SPEED SENSOR
BOWL SPEED SENSOR
LIQUID END
SOLID END
VIBRATION AND E–STOP BARRIER
ALL 18 AWG BLUE INTRINSIC WIRING
NON–INTRINSIC TERMINAL BLOCKS (G0009324)(2)GREEN 4 PT (G0008562)(6) GREY 4 PT (G0008563)(2)ORANGE 4 PT (G0008507)(2) END (G0009839)JUMPER
NOTE: NO CONNECTION OR TIE POINT, CROSSING ONLY
TERMINAL BLOCK (G0008891, G0008892) (G0008893)(4)
TERMINAL BLOCK (G0008956) (G0008890)(4)
GND
SPARE
1" NPT (SHPP–100)
1–1/2" NPT (SHPP–150)
2" NPT (SHPP–200)
2–1/2" NPT (SHPP–250)
CABLE SIZED FOR PUMP MOTOR PROVIDED BY CUSTOMER
CABLE SIZED FOR 72A MAX PROVIDED BY CUSTOMER
CABLE SIZED FOR 172A MAX PROVIDED BY CUSTOMER
PUMP MOTOR NOT TO EXCEED 30 HP
PUMP MOTOR 30 HP 460/480 VAC 60 Hz 3 PH
CONVEYOR 60 HP MOTOR 460/480 VAC 60 Hz 3 PH 72 FLA
BOWL 150 HP MOTOR 460/480 VAC 60 Hz 3 PH 172 FLA
PUMP AND MOTOR PROVIDED BY CUSTOMER
(G0009524)
(G0009523)
PUMP RESTART REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP WILL RESTART (IF PUMP WAS RUNNING)
PUMP ENABLE REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP IS ENABLED TO RUN, WHEN OPEN PUMP WILL STOP
NOTE: CABINET IS SHIPPED WITH TERMINALS 3 AND 4 JUMPERED TO BE REMOVED BY CUSTOMER IF REMOTE PUMP ENABLE IS USED
DO NOT PLACE JUMPER BETWEEN TERMINALS 1 AND 2 AS PUMP MAY START UNINTENTIONALLY
THESE TERMINALS ARE NOT INTENDED FOR INTRINSICALLY SAFE CIRCUITS CONTACT DERRICK CORPORATION IF REMOTE PUMP START/STOP CONTACTS ARE TO BE LOCATED IN A HAZARDOUS AREA (REFER TO DWG # 17237-00)
CONTROL RECEPTACLE
HOUSING/BULKHEAD MOUNTED (G0007846) FEMALE CAGE–CLAMP TERMINAL (G0007848) COVER/BULKHEAD HOUSING (G0007851)
CONTROL PLUG
HOOD/SIDE ENTRY (G0007850) MALE CAGE–CLAMP TERMINAL (G0007852) COVER/HOOD (G0007849) CABLE GLAND (7–17 mm) (G0005238)
GROUND SHIELDS AT PLUG THIS END ONLY
CABLE ASSY,SHIELDED – INTRINSIC (18 COND 18 AWG) (16593–47X100 FT)
EMERGENCY STOP PUSHBUTTON (G0005325)
EMER STOP CIRCULAR LEGEND (G0007244)
INCREASED SAFETY SENSOR SYSTEM JUNCTION BOX (16618–01)
BOWL SPEED SENSOR (G0007862 CABLE)
TEMPERATURE SENSOR LIQUID END (G0007265)
TEMPERATURE SENSOR SOLID END (G0007712)
CLUTCH SPEED SENSOR (G0007861) (G0007862 CABLE)
VIBRATION SWITCH (G0003015)
SENSOR CABLE
BROWN BLUE
WHITE WHITE RED
BLACK RED
COM NC
POWER DISTRIBUTION BLOCK (G0008941)
POWER DISTRIBUTION BLOCK COVER (G0008942)(3)
GROUND BUS BAR (G0005308)
INCOMING GROUND LUG (G0007213)(2) (2) #4–300kcm AWG CU GND
NOTE: STARTED USING 2–1/2" NPT ON UNIT #CF–5039–X
NOTE: STARTED USING 2/0 WIRE ON UNIT #5036–X
2–1/2" NPT CORD FITTING (G0012883)
1/2" NPT CORD FITTING (G0002711)
GEXOL 125 MARINE CABLE – 2/0 AWG (16627–01–001)
XP ENCLOSURE ASSY (16607–02) XP ENCLOSURE (G0007835)
CORD ASSY 20AWG–2C (17382–01–001)
TOUCH PROOF COVERS (G0007693)
TERMINAL LUGS (G0007692)
250 AMP CONTACTOR (G0007691)
CONTROL VOLTAGE TERMINAL (G0007694)
INTRINSIC BARRIER (G0009286) SET TO NO, NB–OFF AND SS–OFF
CENTRIFUGE POWER JUNCTION BOX
GROUND LUG (4 WIRE) (G0007945)
FUSE 1.25 A (G0002928)
FUSE 0.50 A (G0004195)
480VAC
120VAC
100 VA TRANSFORMER (G0002461)
2" NPT (SHPP–200)
3" NPT W/2" REDUCER (G0007258) AND 2" PLUG (SHPP–200)
REF: GA#16590–00–003
REF: PI#16472–00–002
REF: EPL#16593–00–002
REVISION 13 STARTED USING DN DE–7200 UNIT# CF5045–X
REVISION 17 STARTED USING DN DE–7200 CABINET# CF6029–X
REVISION 20 STARTED USING DN DE–7200 UNIT# CF5121, CABINET #CF6208
CAUTION/WARNING
WHEN WIRING THE INPUT POWER WITH PARALLEL WIRE, YOU MUST ENSURE THAT THE CONDUCTORS ARE GROUPED WITH THE SAME PHASE AND THAT BOTH POWER SOURCES ARE IN PHASE AND ROTATING IN THE SAME "CLOCKWISE" DIRECTION. FAILURE TO DO SO WILL RESULT IN PERSONNEL OR EQUIPMENT DAMAGE OR BOTH.
SUPPLY 480 VOLTS 3 PH 60 HZ
RECOMMEND 300 AMP SERVICE
BASED ON CONNECTED LOAD OF 240 AMP
MAIN POWER DISCONNECT SUPPLIED BY CUSTOMER
RECOMMENDED CABLE HOOK–UP
QTY (1) COPPER COND PER PHASE SIZED FOR 300 AMP OR (2) COPPER CONDUCTORS PER PHASE SIZED FOR 150 AMP AT 75C TEMP RISE AND 40C AMBIENT
USE XP SEALING GLAND FOR (1) 3" NPT OR (2) 2" NPT

REV	CHANGE	CKD	DATE
23	REVISE CORD FITTING ON INCOMING CABLE (WAS G0000864)	JFS	10/17/12
22	REVISE OUTPUT WIRING OF BOWL FEEDER–REVERSE LEADS	JFS	09/14/12
21	REVISE REF #16593–00 TO #16593–00–002 FOR NEW DESIGN	JFS	08/14/12
20	REVISE CORD FITTING AT PURGE (WAS G0000445), REVISE INTRINSIC CABLE TO ASSY, ADD CONDUCTOR MOTOR CABLE ASSY (WAS G0003994 & G0000967–1 FT)	JFS	06/15/12
19	REVISE TERM BLOCK END STOP (WAS G0007572), REVISE GLANDS FOR XP ENCL (PART OF CABLE ASSY), ADD RELIEF VALVE AND PARTS, ADD CHE G0000563 TERM BLOCK	JFS	02/27/12
18	ADD WIRE NUMBERS TO13,13/2 AND 33, ADD WIRE LABELS AT JUNCTION BOX 16618–01 REVISE INTRINSIC WIRE TO CABLE ASSEMBLY (WAS G0009402)	JFS	02/27/12
17	REVISE CIRCUIT FEEDING AIR CONDITIONER–NOW USES 24 VDC (WAS 230VAC) & WIRE COLOR	JFS	02/27/12
16	REVISE GROUND BAR (WAS G0009310), ADD NOTE	JFS	02/07/12
15	REVISE INTRINSIC WIRING TO PROVIDED (100 FT)	JFS	02/07/12
14	REVISE 6A (WAS 16590–00)	JFS	06/15/12
13	CHANGE DC– BUS WIRE TO WHITE MARKED, REVISE WIRING TO TEMPERATURE SENSOR	JFS	10/14/11
12	REVISE TEMP SENSOR (WAS G0000373), REV PART TO PROGRAMMED PART (WAS G0008950)	JFS	10/14/11
11	ADDED RTD (G0009972) AND WIRING, REVISED G0007690 TERMINAL LABELING, REVISED G0003991 TERMINAL LABELS, REMOVED THIRD SPARE TERMINAL FROM 16618–01 JUNCTION BOX, RECOMMENDED TERMINAL BLOCKS, ADDED CONTROL RECEPTACLE GROUNDED TERMINAL	JFS	04/26/11
10	CHANGED INTRINSIC TERMINAL BLOCK LABELING, REVISE CONDUCTOR SIZES	JFS	04/26/11
9	REVISED POWER REQUIREMENTS AND RECOMMENDED CABLE FEEDER (WAS 385 AMP)	JFS	04/26/11
8	ADDED THIRD SPARE TERMINAL TO 16618–01, REVISED TERMINAL NUMBERING. REVISED CONTROL RECEPTACLE/PLUG TERMINALS & NUMBERING TO MATCH 16618–01.	JFS	03/24/11
7	REVISE 0.50 CORD FITTING FOR INTRINSIC WIRING (WAS G0004195), REVISE RECOMMENDED POWER FEED–ADD DETAILS	JFS	12/08/10
6	REVISE DRAWING LAYOUT COMPLETELY TO ENLARGE PRINT SIZE, REVISE MOTORS (WAS G0000377–150HP)& G0000600–60 HP), REFER TO PERMANENT FILE COPY FOR REV 1–13	JFS	05/19/10
REV	CHANGE	CKD	DATE

VFD XP DE–7200™ CENTRIFUGE
ELECTRICAL WIRING SCHEMATIC 460/480V 60 HZ

DRN BME CKD JFS DATE 02/07/03 SCALE NONE SHT 23

DRN JFS 09/18/06
CKD RMK 09/19/06

DRAWING NO. 14394–00–009

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

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CONDENSOR FAN 1/2 HP MOTOR 380/400/415 VAC 50 HZ 3 PH

1/2 HP MOTOR (G0007588)

ELBOW 3/4" (CRH-EL29)
NIPPLE 3/4" (NPLE-75-COND)

XP CABLE ASSY 16AWG-6C W/XP GLAND (G0009767)

3/4" NPT CORD FITTING, STRAIGHT (TBS2535)

PURGE SYSTEM (G0007865)

I.S. SWITCH

+ BLU
2 CLR

1/2" NPT

1/2" NPT CORD FITTING (G0002711)

TUBE (G0009864)

ELBOW (G0009863)

RELIEF VALVE (G0008006)

FEED PUMP INPUT FUSES
FUSE HOLDER (G0009477)
FUSES, 90 AMP (G0009476X3)

CENTRIFUGE CONVEYOR INPUT FUSES
FUSE HOLDER (G0009354)
FUSES-125 AMP (G0009530X3)

CENTRIFUGE BOWL INPUT FUSES
FUSE HOLDER (G0007631X6)
FUSES 250 AMP (G0009356X3)

AIR CONDITIONER INPUT FUSES
FUSE HOLDER (G0007214)
FUSES-15 AMP (G0003493X3)

CONDENSOR MOTOR INPUT FUSES
FUSE HOLDER (G0007214)
FUSES-30 AMP (G0008792X3)

AIR CONDITIONER (G0002881)

THERMOSTAT INPUT CONTROL 24 VDC

(G0009974 SENSOR)
(G0009972 CABLE)

TEMP RTD SENSOR 4-20MA OUTPUT

CONVEYOR CONTROLLER (G0009359)

FEED PUMP CONTROLLER (G0009360)

BOWL CONTROLLER (G0009358)

MAX OUTPUT 85 AMP

MAX OUTPUT 205 AMP

MAX OUTPUT 56 AMP

DOUBLE DIODES (G0007227X2)
(16894-08-002)
FUSE HOLDER (G0007240X2)
FUSES-200 AMP (G0007241X2)

PLC (G0007228)
BATTERY (G0008349)
ETHERNET RJ45
MEMORY CARD COMPACTFLASH (G0007995)

POWER SUPPLY 120 V 2 A (G0007229) (G0007230)

ETHERNET RJ45 HMI (G0007976)

USB/PS2 ASSY (17006-02)

MOUSE/POINTER ASSY (17006-01)

POWER SUPPLY 24 VDC, 5 AMPS (G0003552)

ETHERNET SWITCH (G0007928)

ETHERNET CABLE (G0007954)

ETHERNET CABLE (G0007952)

ETHERNET CABLE (G0007795)

ETHERNET CABLE (G0007955)

ETHERNET CABLE (G0007953)

CONNECT SHIELD GROUNDED END OF ETHERNET CABLE AT SWITCH (MARKED W/GREEN TAPE)

1.0MM/18 AVG SHIELDED (G0007696)

1.0MM/18 AVG

EMERGENCY STOP PUSHBUTTON (G0005325)
EMER STOP CIRCULAR LEGEND (G0007244)

33 RED
1.0MM/18 AVG SHIELDED (G0007696)

OUTPUT SURGE PROTECTOR (G0003594)

TERMINAL BLOCK (G0008571) (G0008544)

TOUCH PROOF TERMINAL COVERS (G0003573)

FUSE COVERS / PULLERS (G0002674)

FUSE-7 A (G0002911)
FUSE-32 A (G0000651)

500 VA CE TRANSFORMER (G0008690) 380VAC

NOTE:
NO CONNECTION OR TIE POINT, CROSSING ONLY

NON-INTRINSIC TERMINAL BLOCKS (G0009932=2X2)GREEN 4 PT (G0008562=7) GREY 4 PT (G0008563=2)ORANGE 4 PT (G0008507=2) END

TERMINAL BLOCK (G0008891, G0008892) (G0008893X4)

TERMINAL BLOCK (G0008966) (G0008890X4)

INTRINSIC BARRIER (17244-02)

INTRINSIC BARRIER (17244-02)

INTRINSIC BARRIER (G0007918)

VIBRATION AND E-STOP BARRIER

1 RED INTRINSIC BARRIER (G0009896)

TOGGLE SETTINGS
NO OFF
OFF OFF
NO OFF
OFF OFF

CLUTCH SPEED SENSOR

BOWL SPEED SENSOR

LIQUID END

SOLID END

ALL 18 AWG BLUE INTRINSIC WIRING

POWER DISTRIBUTION BLOCK (G0008941)
POWER DISTRIBUTION BLOCK COVER (G0008942X3)

GROUND BUS BAR (G0005309)

INCOMING GROUND LUG (G0007213X2)
(2) #4-350MCM AWG CU GND

1" NPT
1" NPT-M25 SPARE ADAPTER M25 PLUG (G0008449) (G0008813)
1-1/2" NPT/M40 ADAPTER (G0009197)
1-1/2" NPT/M40 ADAPTER (G0008807) PLUG
2" NPT/M50 (G0008451) ADAPTER (G0008455) PLUG
2-1/2" NPT/M63 (G0009467) ADAPTER (G0009466) PLUG
1" NPT-M25 ADAPTER M25 PLUG (G0008449) (G0008813)

2-1/2" NPT CORD FITTING (G0012883)

GEXOIL 125 MARINE CABLE - 2/0 AWG (16627-01-001)

1/2" NPT CORD FITTING (G0002711)

CABLE SIZED FOR 42A MAX PROVIDED BY CUSTOMER

CABLE SIZED FOR 85A MAX PROVIDED BY CUSTOMER

CABLE SIZED FOR 205A MAX PROVIDED BY CUSTOMER

XP FITTING BY OTHERS

3" NPT/M50 (G0009752) M50 PLUG

3" NPT/M63 (G0009756D) ADAPTER (G0009753) M63 PLUG

PUMP RESTART REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP WILL RESTART (IF PUMP WAS RUNNING)

PUMP ENABLE REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP IS ENABLED TO RUN, WHEN OPEN PUMP WILL STOP

NOTE:
CABINET IS SHIPPED WITH TERMINALS 3 AND 4 JUMPERED TO BE REMOVED BY CUSTOMER IF REMOTE PUMP ENABLE IS USED

DO NOT PLACE JUMPER BETWEEN TERMINALS 1 AND 2 AS PUMP MAY START UNINTENTIONALLY

THESE TERMINALS ARE NOT INTENDED FOR INTRINSICALLY SAFE CIRCUITS CONTACT DERRICK CORPORATION IF REMOTE PUMP START/STOP CONTACTS ARE TO BE LOCATED IN A HAZARDOUS AREA (REFER TO DWG # 17237-00)

GROUND SHIELDS AT PLUG THIS END ONLY

CABLE ASSY,SHIELDED - INTRINSIC (18 COND 18 AWG) (16593-47X100 FT)

CONTROL RECEPTACLE

HOUSING/BULKHEAD MOUNTED (G0007946) FEMALE CAGE-CLAMP TERMINAL (G0007944) COVER/BULKHEAD HOUSING (G0007951)

CONTROL PLUG

HOOD/SIDE ENTRY HOUSING (G0007952) MALE CAGE-CLAMP TERMINAL (G0007950) COVER/HOOD (G0007949) CABLE GLAND (7-17 mm) (G0009236)

EMERGENCY STOP PUSHBUTTON (G0005325)
EMER STOP CIRCULAR LEGEND (G0007244)

INCREASED SAFETY SENSOR SYSTEM JUNCTION BOX (16618-01)

SENSOR CABLE

BOWL SPEED SENSOR (G0007861) (G0007862 CABLE)

TEMPERATURE SENSOR LIQUID END (G0007265)

TEMPERATURE SENSOR SOLID END (G0007712)

CLUTCH SPEED SENSOR (G0007861) (G0007862 CABLE)

VIBRATION SWITCH (G0003015)

XP ENCLOSURE ASSY (16607-01)
XP ENCLOSURE (G0007835)

TOUCH PROOF COVERS (G0007693)
TERMINAL LUGS (G0007692)
350 AMP CONTACTOR (G0007690)
CONTROL VOLTAGE TERMINAL (G0007694)
FUSE 125 A (G0003957)
FUSE 60 A (G0003996)
100 VA TRANSFORMER (G0002482)

GROUND LUG (4 WIRE) (G0007945)

CENTRIFUGE POWER JUNCTION BOX

CORD ASSY 20AWG-2C (17382-01-001)

2" NPT/M50 ADAPTER (G0008450) PLUG (G0008455)

3" NPT W/2" REDUCER (G0007258)

CAUTION/WARNING

WHEN WIRING THE INPUT POWER WITH PARALLEL WIRE, YOU MUST ENSURE THAT THE CONDUCTORS ARE GROUPED WITH THE SAME PHASE AND THAT BOTH POWER SOURCES ARE IN PHASE AND ROTATING IN THE SAME "CLOCKWISE" DIRECTION. FAILURE TO DO SO WILL RESULT IN PERSONNEL OR EQUIPMENT DAMAGE OR BOTH.

SUPPLY 380/400 VOLTS 3 PH 50 HZ
RECOMMEND 400 AMP SERVICE
BASED ON CONNECTED LOAD OF 290 AMP

MAIN POWER DISCONNECT SUPPLIED BY CUSTOMER

RECOMMENDED CABLE HOOK-UP
SIZED FOR 400 AMP
(2) COPPER CONDUCTORS PER PHASE SIZED FOR 200 AMP AT 75C TEMP RISE AND 40C AMBIENT
USE XP SEALING GLAND FOR (2) 2" NPT/M50

REVISION 4 STARTED USING ON DE-1000 UNIT# CF5067

REVISION 8 STARTED USING ON DE-1000 UNIT# CFxxxx

REF: CA#16590-00-003
REF: PL#16472-00-003
REF: EPL#16593-00-002

REV	CHANGE	DRN	DATE
12	REVISE CORD FITTING ON INCOMING CABLE (WAS G0000864)	JFS	10/17/12
11	REVISE OUTPUT WIRING OF BOWL FEEDER-REVERSE LEADS REVISE REF #0093-00 TO #0093-00-002 FOR NEW DESIGN	JFS JWB	09/14/12
10	NON-INTRINSIC TERMINAL BLOCK END WAS G0007912,RED WIRE WAS 32 RED ADD RELIEF VALVE AND PARTS, ADD GROUND TERMINAL AT SURGE PROTECTOR	TMW	07/12/12
9	REVISE CONDENSOR MOTOR CABEL TO ASSY (WAS G0002888 & G0002977), CORRECT ERROR ON BOWL FEEDER ADAPTER (WAS 3"), REVISE TB END (WAS G0007912),CUST PUMP FITTINGS	JFS	06/19/12
8	ADD WIRE NUMBERS 4, 29 AND 33, ADD WIRE LABELS AT JUNCTION BOX 16618-01 REVISE INTRINSIC WIRE TO CABLE ASSEMBLY (WAS G0009440), ADD TO TITLE BLK "SERV"	JFS	10/11/11
7	REVISE G4 (WAS 16590-00)	JFS	10/11/11
6	CHANGE DC- WIRE TO MARKED WHITE /REVISE WIRING TO TEMPERATURE SENSOR, REVISE TEMPERATURE SENSOR (WAS G0000972), REV #4 TO PROGRAMMED PART (WAS G0000825)	JFS	10/11/11
5	REVISE WIRE FEEDING LINE FUSE FOR CONVEYOR DRIVE (WAS BLO 4/0)	JFS	09/30/11
4	CHANGE METRIC REDUCER (WAS G0000452) AT CONDENSOR MOTOR AND ADD NEW FITTINGS ADDED W25 (G0000977) AND WIRING, REVISED G0000939 TERMINAL LABELING, REVISED G0003089 TERMINAL LABELS, RESERVED THIRD SPARE TERMINAL FROM 16618-01 JUNCTION BOX, REMUMBERED TERMINALS, ADDED INTRINSIC CONTROL RECEPTACLE GROUND TERMINAL, REVISED RECOMMENDED CABLE SIZE (WAS 350 AMP), REVISE CONDUCTOR SIZES (WAS BOWL 1/0 AWG/70MM, CONV 4AWG/18MM, PUMP 8AWG/10MM)	JFS	09/28/11
3	ADDED THIRD SPARE TERMINAL IN 16618-01 JUNCTION BOX, REMUMBERED WIRING TERMINALS, REVISED TERMINALS & NUMBERING ON CONTROL RECEPTACLE,PLUG TO MATCH 16618-01,	JFS	09/19/11
2	REVISE 0.5 CORD FITTING FOR INTRINSIC WIRING (WAS G0004448), REVISE RECOMMENDED POWER FEED-HOSE DETAIL	JFS	09/09/10
1	REVISE M25 STOPPING PLUGS (WAS G0008807), REVISE 2-1/2" ADAPTER AT 60 HP MOTOR TO 3" ADAPTER (WAS G0009449) & PLUG (WAS G0009462), & M63 PLUG (WAS G0009466)	JFS	03/25/11
REV	CHANGE	CKD	DATE

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TITLE	VFD XP DE-7200™ CENTRIFUGE ELECTRICAL WIRING SCHEMATIC 380/400/415V 50 HZ
DRN	BMB 02/07/03
CKD	JFS
SCALE	NONE
REV	12
SHEET SIZE	D
SHEET NO.	1 OF 1
DRN	JWC 05/06/10
CKD	JFS
DRAWING NO.	14394-00-011

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CEN, MAN

CONDENSOR FAN 1/2 HP MOTOR 460 VAC 60HZ 3 PH

0.50 HP MOTOR (G0007588)

CORD FITTING 90 DEGREE(CRH-EL296) 3/4" NPT XP GLAND (G0002966)

3/4" NPT CORD FITTING (TBS2535)

PURGE SYSTEM (G0007865)

I.S. SWITCH

+ BLU

2 CLR

1/2" NPT CORD FITTING (G0002711)

TUBE (G0009864)

EL.BOW (G0009863)

RELIEF VALVE (G0008006)

FEED PUMP INPUT FUSES

FUSE HOLDER (G0007221)

FUSES-50 AMP (G0007222)(3)

FUSES/COVER INDICATOR (G0007223)(3)

50 AMP

CENTRIFUGE CONVEYOR INPUT FUSES

FUSE HOLDER (G0009477)

FUSES-90 AMP (G0009476)(3)

90 AMP

CENTRIFUGE BOWL INPUT FUSES

FUSE HOLDER (G0007631)(6)

FUSES-175 AMP (G0009353)(3)

175 AMP

AIR CONDITIONER INPUT FUSES

FUSE HOLDER (G0007214)

FUSES-5 A (G0009451)(3)

6.0 AMP

350VA TRANSFORMER #1 480V PRI/120V SEC (G0008057)

JUMPER X1-H1 X2-H2 H3-H3 H4-H4

570VAC

350VA TRANSFORMER #2 480V PRI/120V SEC (G0008057)

480VAC 575VAC 570VAC

FUSE HOLDER (G0007214)

FUSES-3 AMP (G0008792)(3)

3.0 AMP

AIR CONDITIONER (G0002881)

THERMOSTAT INPUT CONTROL 24 VDC

TEMP RTD SENSOR 4-20MA OUTPUT

(G0009974 SENSOR) (G0009972 CABLE)

CONVEYOR CONTROLLER 60HP (G0009351)

FEED PUMP CONTROLLER 90HP (G0009352)

INVERTER

BOWL SPEED SENSOR 1+ ANALOG 4-20MA 2+

CLUTCH SPEED SENSOR 3- ANALOG 4-20MA 4+

PUMP ENABLE 29 E-STOP 32 VIB MON 31 SPEED SENSOR 30 COM 25

RJ45

MAX 41 AMP OUTPUT

MAX 63 AMP OUTPUT

DOUBLE DIODES (G0007277)(2) (16894-60-002)

FUSE HOLDER (G0009481)

FUSES 100 A (G0009480)(2)

BL AC/X

WHITE

INVERTER

BOWL CONTROLLER 150HP (G0009350)

PUMP RESTART 28

E-STOP 32 VIB MON 31 SPEED SENSOR 30 TEMP SENSOR LIQUID 1- 4-20MA 24+ COM 25

MAX 144 AMP OUTPUT

D.C. BUS WIRE DC- DC+

DL04 AWG

ETHERNET CABLE (G0007954)

ETHERNET CABLE (G0007953)

CONNECT SHIELD GROUNDED END OF ETHERNET CABLE AT SWITCH (MARKED W/GREEN TAPE)

ETHERNET RJ45 ETHERNET RJ45 SWITCH (G0007231)

ETHERNET RJ45 VGA

ETHERNET CABLE (G0007952)

ETHERNET CABLE (G0007951)

ETHERNET CABLE (G0007955)

PLC (G0007228) BATTERY (G0008349) ETHERNET RJ45 MEMORY CARD COMPACTFLASH (G0007995)

POWER SUPPLY 120 V 2 A (G0007229) (G0007230)

ETHERNET RJ45 HMI (G0007976)

USB/PS2 ASSY (17006-02)

MOUSE/POINTER ASSY (17006-01)

POWER SUPPLY 24 VDC, 4 AMPS (G0003552)

EMERGENCY STOP PUSHBUTTON (G0005325) EMER STOP CIRCULAR LEGEND (G0007244)

1 RED 10MM/18 AWG SHIELDED (G0007696)

33 RED 10MM/18 AWG SHIELDED (G0007696)

SURGE PROTECTOR (G0003504)

THHN-14-STR-BLK

THHN-14-STR-WHT

FUSE 7.0 A (G0002911)

TOUCH PROOF TERMINAL COVERS (G0002873)

FUSE COVERS / PULLERS (G0002874)

120VAC

500 VA TRANSFORMER (G0004986) 575/600V

THHN-14-STR-BLK

FUSE 2.0 A (G0009183)

FUSE 2.0 A (G0009183)

POWER DISTRIBUTION BLOCK (G0008941)

POWER DISTRIBUTION BLOCK COVER (G0008942X3)

NOTE: NO CONNECTION OR TIE POINT. CROSSING ONLY REVERSE WIRING AT TERMINAL BLOCK

TERMINAL BLOCK (G0008891, G0008892) (G0008893X4)

TERMINAL BLOCK (G0008891, G0008892) (G0008893X4)

TERMINAL BLOCK (G0008966) (G0008890X4)

NON-INTRINSIC TERMINAL BLOCKS (G0009324X2)GREEN 4 PT (G0008562X7) GREY 4 PT (G0008563X2)ORANGE 4 PT (G0008507X2) END

G 1 2 3 4 5 5 6 SPARE

INTRINSIC BARRIER (17244-02) CLUTCH SPEED SENSOR

INTRINSIC BARRIER (17244-02) BOWL SPEED SENSOR

INTRINSIC BARRIER (G0007918) LIQUID END

INTRINSIC BARRIER SOLID END

INTRINSIC BARRIER (G0009286) TOGGLE SETTINGS NO OFF OFF NO OFF OFF

VIBRATION AND E-STOP BARRIER

ALL 18 AWG BLUE INTRINSIC WIRING

(SHPP-150) PLUG 1-1/2" NPT CORD FITTING BY OTHERS

(SHPP-200) PLUG 2" NPT CORD FITTING BY OTHERS

(SHPP-250) PLUG 2 1/2" NPT CORD FITTING BY OTHERS

1" NPT (SHPP-100) PLUG

1" NPT (SHPP-100) PLUG

SPARE

RECOMMENDED EXPLOSIONPROOF CABLE MAX 32 AMP AT 40 C PROVIDED BY CUSTOMER SIZED FOR MOTOR CURRENT

RECOMMENDED EXPLOSIONPROOF CABLE SIZED FOR 60 AMP AT 40 C PROVIDED BY CUSTOMER

RECOMMENDED EXPLOSIONPROOF CABLE SIZED FOR 144 AMP AT 40 C PROVIDED BY CUSTOMER

XP ADAPTER AND SEALING GLAND PROVIDED BY OTHERS

XP ADAPTER AND SEALING GLAND PROVIDED BY OTHERS

PUMP SIZED FOR MAXIMUM 30HP/32FLA

PUMP MOTOR 30 HP 32FLA 575/600 VAC 60 Hz 3 PH

PUMP AND MOTOR PROVIDED BY OTHERS

CONVEYOR MOTOR 60 HP-62FLA 575/600 VAC 60 Hz 3 PH

CONVEYOR MOTOR (G0009808)

BOWL MOTOR 150 HP-144FLA 575/600 VAC 60 Hz 3 PH

BOWL MOTOR (G0009807)

GROUND SHIELDS AT PLUG THIS END ONLY

CONTROL RECEPTACLE

CONTROL PLUG

HOUSING/BULKHEAD MOUNTED (G0007946) FEMALE CAGE-CLAMP TERMINAL (G0007948) COVER/BULKHEAD HOUSING (G0007952)

HOUSING/SIDE ENTRY (G0007950) MALE CAGE-CLAMP TERMINAL (G0007951) COVER/MSDB (G0007949) CABLE GLAND (7-17 mm) (G0009230)

INCOMING GROUND LUG (G0007213X2)

GROUND BUS BAR (G0003039)

2-1/2" NPT CORD FITTING (G0012883)

(2) 2/0-4/C XP CABLE ASSEMBLY (16827-01-000)

2-1/2" NPT CORD FITTING (G0012883)

1/2" NPT CORD FITTING (G0002711)

CORD ASSY 20AWG-2C (17382-01-001)

(G0007256) (SHPP-200)

3" NPT W/2" REDUCER, AND PLUG

2" NPT PLUG (SHPP-200)

(16607-03) XP ENCLOSURE ASSY

CABLE,SHIELDED - INTRINSIC (18 COND 18 AWG) (16593-47X100 FT)

EMERGENCY STOP PUSHBUTTON (G0005325) EMER STOP CIRCULAR LEGEND (G0007244)

INCREASED SAFETY SENSOR SYSTEM JUNCTION BOX (16618-01)

SENSOR CABLE

BOWL SPEED SENSOR (G0007861) (G0007862 CABLE)

TEMPERATURE SENSOR LIQUID END (G0007265)

TEMPERATURE SENSOR SOLID END (G0007712)

CLUTCH SPEED SENSOR (G0007861) (G0007862 CABLE)

VIBRATION SWITCH (G0003015)

350 AMP CONTACTOR (AC1) (G0007691,G0007692) (G0007693,G0007694)

FUSE 1.25 A (G0002928)

FUSE 0.50 A (G0008998)

FUSE 0.40 A (G0008999)

100 VA TRANSFORMER (G0009000)

INTRINSIC BARRIER (G0009286)

CENTRIFUGE POWER JUNCTION BOX

GROUND LUG (G0007945)

NOTE:
CABINET IS SHIPPED WITH TERMINALS 3 AND 4 JUMPERED, TO BE REMOVED BY CUSTOMER IF REMOTE PUMP ENABLE IS USED.

DO NOT PLACE JUMPER BETWEEN TERMINALS 1 AND 2 AS PUMP MAY START UNINTENTIONALLY

THESE TERMINALS ARE NOT INTENDED FOR INTRINSICALLY SAFE CIRCUITS CONTACT DERRICK CORPORATION IF REMOTE PUMP START/STOP CONTACTS ARE TO BE LOCATED IN A HAZARDOUS AREA (REFER TO DWG # 17237-00)

REMOTE N.O. CONTACT (PROVIDED BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP WILL RESTART (IF PUMP WAS RUNNING)

REMOTE N.O. CONTACT (PROVIDED BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP IS ENABLED TO RUN

SUPPLY 575/600 VOLTS 3 PH 60 HZ
RECOMMEND 300 AMP SERVICE
BASED ON CONNECTED LOAD OF 240 AMP

MAIN POWER DISCONNECT SUPPLIED BY CUSTOMER

RECOMMENDED CABLE HOOK-UP QTY (1) COPPER COND PER PHASE SIZED FOR 300 AMP OR (2) COPPER CONDUCTORS PER PHASE SIZED FOR 150 AMP AT 75C TEMP RISE AND 40C AMBIENT USE XP SEALING GLAND FOR (1) 3" NPT ENTRY OR (2) 2" NPT ENTRY

CAUTION/WARNING
WHEN WIRING THE INPUT POWER WITH PARALLEL WIRE, YOU MUST ENSURE THAT THE CONDUCTORS ARE GROUPED WITH THE SAME PHASE AND THAT BOTH POWER SOURCES ARE IN PHASE AND ROTATING IN THE SAME "CLOCKWISE" DIRECTION. OR EQUIPMENT DAMAGE OR BOTH.

⚠ REVISION 9 STARTED USING ON DE-7200 UNIT# CFxxxx

⚠ REVISION 10 STARTED USING ON DE-7200 UNIT# CFxxxx

REF. P.L. # 16593-00-002 ⚠
REF. P.L. # 16472-00-004
REF. G.A. # 16590-03 ⚠

REV	CHANGE	CKD	DATE
13	REVISE CORD FITTING ON INCOMING CABLE (WAS G0003864)	JFS	10/17/12
12	REVISE FUSE FEEDING TRANSFORMER FOR AIR CONDITIONER (WAS 3A G0007588)	JFS	09/28/12
11	REVISE INPUT WIRING OF BOWL FEEDER-REVERSE LEADS REVISE REF #16593-00 TO #16593-00-002 FOR NEW DESIGN	JFS MB	09/14/12
10	CORRECT PARTS LIST DRAWING REFERENCE NUMBER (WAS DR. #16593-00-003) REPLACE INTRINSIC CABLE WITH CORD ASSEMBLY (WAS G0007908 & G0004444)		
9	REVISE CORD FITTING AT PURGE (WAS G0004480), ADD RELIEF VALVE AND PARTS, REVISE AIR COND FUSE (WAS FUSES),REVISE TERM BLK END (WAS G0007952)	JFS	07/27/12
8	ADD WIRE NUMBERS 10,12,13, 32 AND 30,AND WIRE LABELS AT JUNCTION BOX 16618-01 REVISE INTRINSIC WIRE TO CABLE ASSEMBLY (WAS G0008562)	JFS	10/14/11
7	REVISE CIRCUIT FEEDING AIR CONDITIONER-NOW USES 240VC (WAS 230 VAC) & WIRE COLOR REVISE GROUND BAR (WAS G0007950), ADD NOTE	JFS	02/27/12
6	REVISE INTRINSIC WIRING TO PROVIDED (100 FT)	JFS	02/07/12
5	REVISE TO PROGRAMMED PART (WAS G0008855), REVISE GA (WAS 16590-00)	JFS	02/07/12
4	CHANGE DC- WIRE TO MARKED WHITE ,REVISE WIRING TO TEMPERATURE SENSOR, REVISE TEMPERATURE SENSOR (WAS G0008497), REV ETHERNET CABLES (WERE G0008521 TO -23)	JFS	10/14/11
3	ADDED RTD (G0009973) AND WIRING, REVISED G0009351 TERMINAL LABELING, REVISED G0003039 TERMINAL LABELS, REMOVED THIRD SPARE TERMINAL FROM 16618-01 JUNCTION BOX, RENUMBERED TERMINAL BLOCKS, ADDED CONTROL RECEPTACLE GROUND TERMINAL. REVISE CONDUCTOR SIZES	DSD	05/02/11
2	ADDED THIRD SPARE TERMINAL IN 16618-01 JUNCTION BOX, RENUMBERED WIRING TERMINALS DSD. REVISED TERMINALS & NUMBERING ON CONTROL RECEPTACLE,PLUG TO MATCH 16618-01.	JFS	03/25/11
1	REVISE 0.50 CORD FITTING FOR INTRINSIC WIRING (WAS G0004449)	JFS	12/08/10
REV	REVISE MOTORS (WERE G0009366 AND G0009391)REVISE CLUTCH SPEED SENSOR LABELS (WERE SPEC AND SPEC), MINOR REVISIONS	JFS	10/26/10

REV	CHANGE	CKD	DATE
2	REVISE DC BUS WIRE, REVISE GROUND WIRE SIZE, REVISED RECOMMENDED FEEDER SIZE (WAS 225 A OR DUAL 100 A), REVISE BOWL INPUT FUSE BLOCK (WAS G0008384)	JFS	05/04/10
1	REVISE CONVEYOR FAN WIRING (INTERNALLY CONNECTED) REVISE CLUTCH SPEED SENSOR (WAS G0008618 PRIOR TO UNIT #F0540)		
REV	CHANGE	CKD	DATE
	REVISE RECOMMENDED SUPPLY CURRENT (WAS 210A), ADD CONNECTOR INPUT FUSES AND HOLDER, REVISE DC BUS WIRE (WAS 1AWG), CHG DC TO 100A FUSE, MINOR CORRECTIONS	MB	04/28/10

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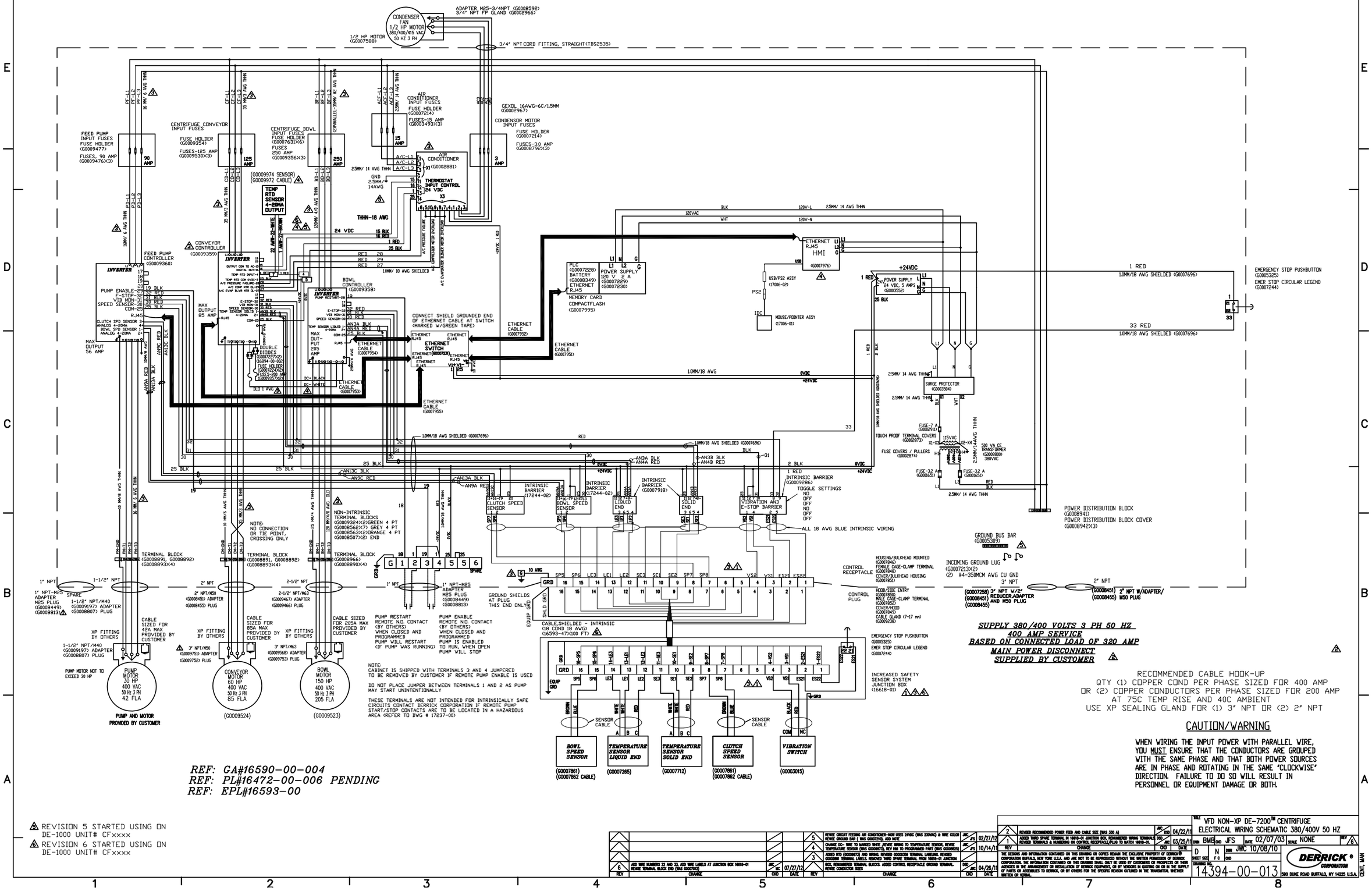
DRN BMB CKD JFS DATE 02/07/03 SCALE NONE REV 13
DSN JWC 01/29/10
CKD JFS 02/12/10
SHEET SIZE D FC N
DRAWING NO. 14394-00-012

VFD XP DE-7200™ CENTRIFUGE ELECTRICAL WIRING SCHEMATIC 575/600V 60 HZ

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CONT. MAIN


CONDENSER FAN 1/2 HP MOTOR 380/400/415 VAC 50 HZ 3 PH
1/2 HP MOTOR (G0007588)
ADAPTER M25-3/4NPT (G0008592) 3/4" NPT FP GLAND (G0002966)
3/4" NPT CORD FITTING, STRAIGHT (TBS2535)
GEXDL 16AWG-6C/1.5MM (G0002967)
FEED PUMP INPUT FUSES FUSE HOLDER (G0009477)
FUSES, 90 AMP (G0009476X3)
CENTRIFUGE CONVEYOR INPUT FUSES
FUSE HOLDER (G0009354)
FUSES-125 AMP (G0009530X3)
CENTRIFUGE BOWL INPUT FUSES FUSE HOLDER (G0007631X6)
FUSES 250 AMP (G0009356X3)
AIR CONDITIONER INPUT FUSES FUSE HOLDER (G0007214)
FUSES-15 AMP (G0003493X3)
CONDENSOR MOTOR INPUT FUSES FUSE HOLDER (G0007214)
FUSES-3.8 AMP (G0008790X3)
AIR CONDITIONER (G0002881)
THERMOSTAT INPUT CONTROL 24 VDC
(G0009974 SENSOR) (G0009972 CABLE)
TEMP RTD SENSOR 4-20MA OUTPUT
CONVEYOR CONTROLLER (G0009359)
FEED PUMP CONTROLLER (G0009360)
BOWL CONTROLLER (G0009358)
INVERTER
PUMP ENABLE-26
E-STOP-32
VIB MON-30
SPEED SENSOR-20
COM-25
MAX OUTPUT 85 AMP
MAX OUTPUT 56 AMP
CLUTCH SPD SENSOR
BOWL SPD SENSOR
ANALOG 4-20MA
DOUBLE DIODES (G0007227X2) (15894-00-002)
FUSE HOLDER (G0007224X2)
FUSES-200 AMP (G0009257X2)
CONNECT SHIELD GROUNDED END OF ETHERNET CABLE AT SWITCH (MARKED W/GREEN TAPE)
ETHERNET SWITCH (G0007239)
ETHERNET CABLE (G0007954)
ETHERNET CABLE (G0007953)
ETHERNET CABLE (G0007955)
ETHERNET CABLE (G0007952)
ETHERNET CABLE (G0007951)
PLC (G0007228) BATTERY ETHERNET RJ45 MEMORY CARD COMPACTFLASH (G0007995)
POWER SUPPLY 120 V 2 A (G0007229) (G0007230)
ETHERNET RJ45 HMI (G0007976)
USB/PS2 ASSY (17006-02)
MOUSE/POINTER ASSY (17006-01)
+24VDC
POWER SUPPLY 24 VDC, 5 AMPS (G0003552)
EMERGENCY STOP PUSHBUTTON (G0005325)
EMER STOP CIRCULAR LEGEND (G0007244)
SURGE PROTECTOR (G0003584)
TOUCH PROOF TERMINAL COVERS (G0002873)
FUSE COVERS / PULLERS (G0002874)
FUSE-7 A (G0002911)
FUSE-12 A (G0002625)
500 VA CE TRANSFORMER (G0008880) 380VAC
INTRINSIC BARRIER (17244-02)
INTRINSIC BARRIER (G0007918)
INTRINSIC BARRIER (G0009286)
TOGGLE SETTINGS
CLUTCH SPEED SENSOR
BOWL SPEED SENSOR
LIQUID END
SOLID END
VIBRATION AND E-STOP BARRIER
ALL 18 AWG BLUE INTRINSIC WIRING
NON-INTRINSIC TERMINAL BLOCKS (G0009324X2)GREEN 4 PT (G0008562X7) GREY 4 PT (G0008563X2)ORANGE 4 PT (G0008507X2) END
NOTE: NO CONNECTION OR TIE POINT, CROSSING ONLY
TERMINAL BLOCK (G0008891, G0008892) (G0008893X4)
TERMINAL BLOCK (G0008891, G0008892) (G0008893X4)
TERMINAL BLOCK (G0008891, G0008892) (G0008890X4)
TERMINAL BLOCK (G0008964) (G0008965X4)
SPARE
1" NPT
1" NPT-M25 ADAPTER M25 PLUG (G0008449) (G0008813)
1-1/2" NPT
1-1/2" NPT/M40 ADAPTER (G0009197) (G0008807) PLUG
2" NPT
2" NPT/M50 ADAPTER (G0008451) PLUG (G0008455)
2-1/2" NPT
2-1/2" NPT/M63 ADAPTER (G0009467) (G0009466) PLUG
3" NPT/M50 ADAPTER (G0009751) PLUG (G0009752)
3" NPT/M63 ADAPTER (G0009568) PLUG (G0009753)
XP FITTING BY OTHERS
CABLE SIZED FOR 42A MAX PROVIDED BY CUSTOMER
CABLE SIZED FOR 85A MAX PROVIDED BY CUSTOMER
CABLE SIZED FOR 205A MAX PROVIDED BY CUSTOMER
PUMP MOTOR NOT TO EXCEED 30 HP
PUMP AND MOTOR PROVIDED BY CUSTOMER
PUMP MOTOR 30 HP 400 VAC 50 Hz 3 PH 42 FLA
CONVEYOR MOTOR 60 HP 400 VAC 50 Hz 3 PH 85 FLA (G0009524)
BOWL MOTOR 150 HP 400 VAC 50 Hz 3 PH 205 FLA (G0009523)
PUMP RESTART REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP WILL RESTART (IF PUMP WAS RUNNING)
PUMP ENABLE REMOTE N.O. CONTACT (BY OTHERS) WHEN CLOSED AND PROGRAMMED PUMP IS ENABLED TO RUN, WHEN OPEN PUMP WILL STOP
NOTE: CABINET IS SHIPPED WITH TERMINALS 3 AND 4 JUMPERED TO BE REMOVED BY CUSTOMER IF REMOTE PUMP ENABLE IS USED
DO NOT PLACE JUMPER BETWEEN TERMINALS 1 AND 2 AS PUMP MAY START UNINTENTIONALLY
THESE TERMINALS ARE NOT INTENDED FOR INTRINSICALLY SAFE CIRCUITS CONTACT DERRICK CORPORATION IF REMOTE PUMP START/STOP CONTACTS ARE TO BE LOCATED IN A HAZARDOUS AREA (REFER TO DWG # 17237-00)
GROUND SHIELDS AT PLUG THIS END ONLY
CABLE_SHIELDED - INTRINSIC (18 COND 18 AWG) (16593-47)X100 FT)
BOWL SPEED SENSOR (G0007861) (G0007862 CABLE)
TEMPERATURE SENSOR LIQUID END (G0007265)
TEMPERATURE SENSOR SOLID END (G0007712)
CLUTCH SPEED SENSOR (G0007861) (G0007862 CABLE)
VIBRATION SWITCH (G0003015)
SENSOR CABLE
CONTROL RECEPTACLE
HOUSING/BULKHEAD MOUNTED (G0007846) FEMALE CAGE-CLAMP TERMINAL (G0007848) COVER/BULKHEAD HOUSING (G0007851)
CONTROL PLUG
HOOD/SIDE ENTRY (G0007850) MALE CAGE-CLAMP TERMINAL (G0007852) COVER/HOOD (G0007849) CABLE GLAND (7-17 mm) (G0009238)
INCREASED SAFETY SENSOR SYSTEM JUNCTION BOX (16618-01)
GROUND BUS BAR (G0005309)
INCOMING GROUND LUG (G0007213X2) (2) #4-350MCM AWG CU GND
(G0007258) 3" NPT W/2" REDUCER ADAPTER AND M50 PLUG (G0008451) (G0008455)
(G0008451) 2" NPT W/ADAPTER/ (G0008455) M50 PLUG
POWER DISTRIBUTION BLOCK (G0008941)
POWER DISTRIBUTION BLOCK COVER (G0008942X3)
SUPPLY 380/400 VOLTS 3 PH 50 HZ
400 AMP SERVICE
BASED ON CONNECTED LOAD OF 320 AMP
MAIN POWER DISCONNECT
SUPPLIED BY CUSTOMER
RECOMMENDED CABLE HOOK-UP
QTY (1) COPPER COND PER PHASE SIZED FOR 400 AMP
OR (2) COPPER CONDUCTORS PER PHASE SIZED FOR 200 AMP
AT 75C TEMP RISE AND 40C AMBIENT
USE XP SEALING GLAND FOR (1) 3" NPT OR (2) 2" NPT
CAUTION/WARNING
WHEN WIRING THE INPUT POWER WITH PARALLEL WIRE, YOU MUST ENSURE THAT THE CONDUCTORS ARE GROUPED WITH THE SAME PHASE AND THAT BOTH POWER SOURCES ARE IN PHASE AND ROTATING IN THE SAME 'CLOCKWISE' DIRECTION. FAILURE TO DO SO WILL RESULT IN PERSONNEL OR EQUIPMENT DAMAGE OR BOTH.
REF: GA#16590-00-004
REF: PL#16472-00-006 PENDING
REF: EPL#16593-00
REVISION 5 STARTED USING ON DE-1000 UNIT# CFxxxx
REVISION 6 STARTED USING ON DE-1000 UNIT# CFxxxx
REV 6 ADD WIRE NUMBERS 22 AND 33, ADD WIRE LABELS AT JUNCTION BOX 16618-01 REVISE TERMINAL BLOCK END (BAS 0000702) ABC/MC 07/27/12
REV 5 REVISE CIRCUIT FEEDING AIR CONDITIONER-NOW USES 240VAC (WAS 220VAC) & WIRE COLOR REVISE GROUND BAR (WAS G0007230), ADD NOTE ABC/JFS 02/27/12
REV 4 CHANGE DC- WIRE TO MARKED WHITE AT/NEAR WIRING TO TEMPERATURE SENSOR, REVISE TEMPERATURE SENSOR (WAS G0006972), REV #88 TO PROGRAMMED PART (WAS G0008260) ABC/JFS 10/14/11
REV 3 ADDED #28 (G0009973) AND WIRING, REVISED G0006350 TERMINAL LABELING, REVISED G0003888 TERMINAL LABELS, REMOVED THIRD SPARE TERMINAL FROM 16618-01 JUNCTION BOX, REMANDERED TERMINAL BLOCKS, ADDED CONTROL RECEPTACLE GROUND TERMINAL. DSD/ABC 04/26/11
REV 2 REVISED RECOMMENDED POWER FEED AND CABLE SIZE (WAS 230 A) ABC/DSD 04/22/11
REV 1 ADDED THIRD SPARE TERMINAL IN 16618-01 JUNCTION BOX, REMANDERED WIRING TERMINALS DSD/ABC 03/25/11
REVISED TERMINALS & NUMBERING ON CONTROL RECEPTACLE/PLUG TO MATCH 16618-01.
DRN BMB CHD JFS DATE 02/07/03 SCALE NONE REV 6
DRN JWC 10/08/10 SHEET SIZE D FC N CHD
DRAWING NO. 14394-00-013
VFD NON-XP DE-7200™ CENTRIFUGE
ELECTRICAL WIRING SCHEMATIC 380/400V 50 HZ
DERRICK® CORPORATION 590 DUKE ROAD BUFFALO, NY 14225 U.S.A.
CERT. MAN
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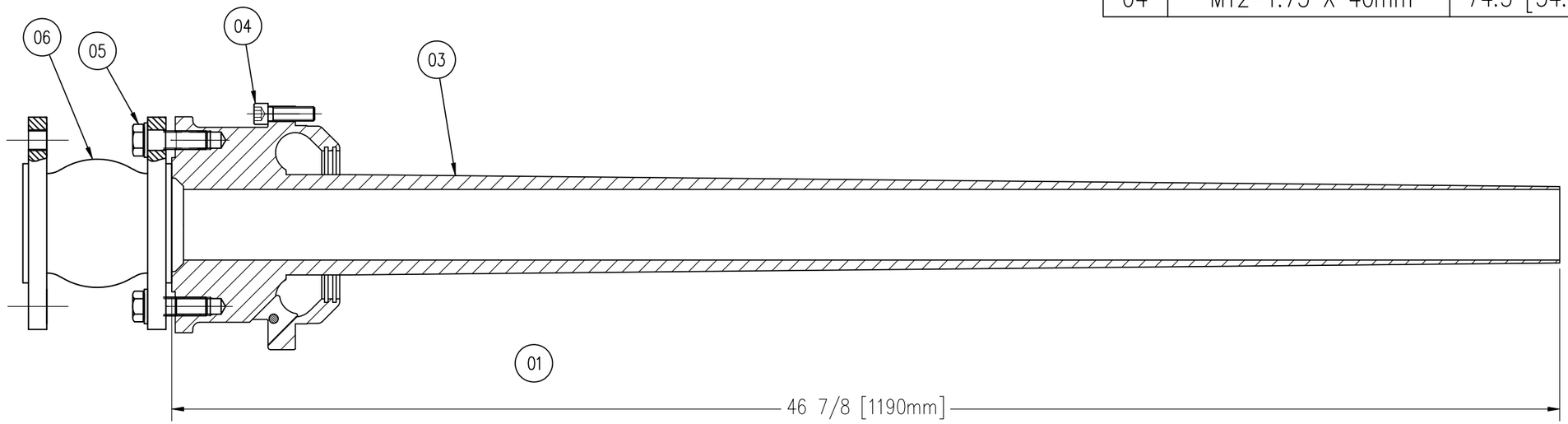
ITEM	DESCRIPTION	TORQUE SETTING (Nm)
04	M12-1.75 X 40mm	74.3 [54.8 FT-LBS]



	QTY	ITEM	PART NUMBER	DESCRIPTION/PART NAME
3		07		
1	1	06	G0009232	FLEX JOINT (ANSI PATTERN)
1	4	05	HXCS-63-11X200	HEX HEAD BOLT
	4	04	G0007889	SOCKET HEAD SCREW
3 1	1	03	G0012473	FEED TUBE
3		02		
3		01	G0012218	FEED TUBE ASSEMBLY

GA: 16590-00-003
GA: 16590-00-005

REV	CHANGE	CKD	DATE
3	CHANGED ITEM 01 (WAS 16606-01-001), REMOVED ITEM 02 (WAS 16602-02-001), CHANGED ITEM 03 (WAS G0012218), REMOVED ITEM 07 (WAS 16606-07-001),	JMB	2/23/12
	REMOVED NOTE FOR FEED PIPE ASSEMBLY, ADDED REF GA 16590-00-005, UPDATED VIEWS		
2	UPDATED NOTE FOR FEED PIPE, WAS FOR NEW UNITS CF005058 AND ABOVE; UPDATED VIEW OF FEED PIPE: REMOVED RIDGE AT DISCHARGE END	EJR	1/6/12
1	ITEM 03 WAS G0007888, UPDATED VIEW; ITEM 05 WAS G0008103; ITEM 06 WAS G0007895 ADDED NOTE FOR APPLICABLE UNITS	EJR	8/27/11

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TITLE: FEED TUBE ASSEMBLY
DE-7200 CENTRIFUGE

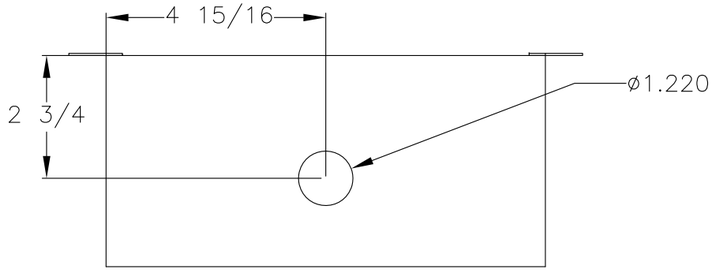
DWN CCS | CKD | DATE 2/1/07 | SCALE NTS | REV 3

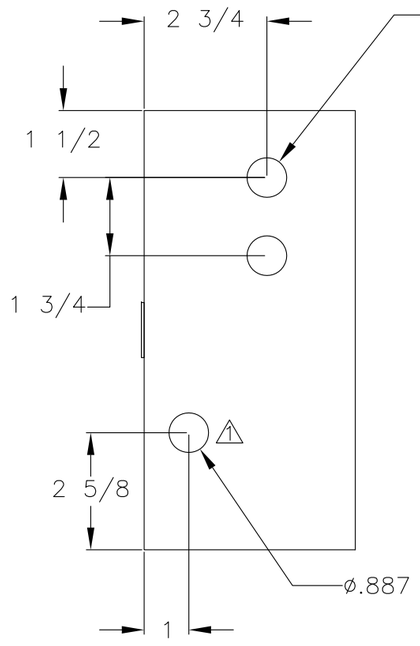
SHEET SIZE B | F C Y | DWN JMB 7/21/11 | CKD

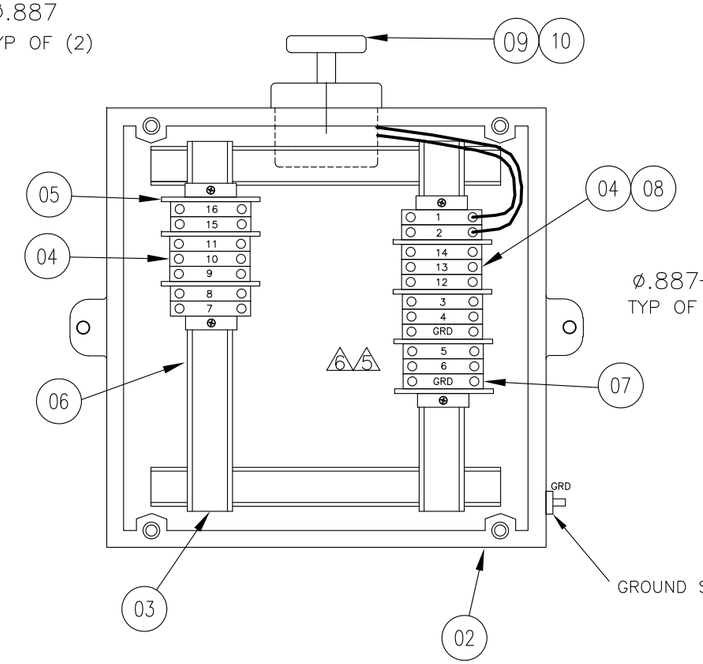
DRAWING NO. 16606-00-001

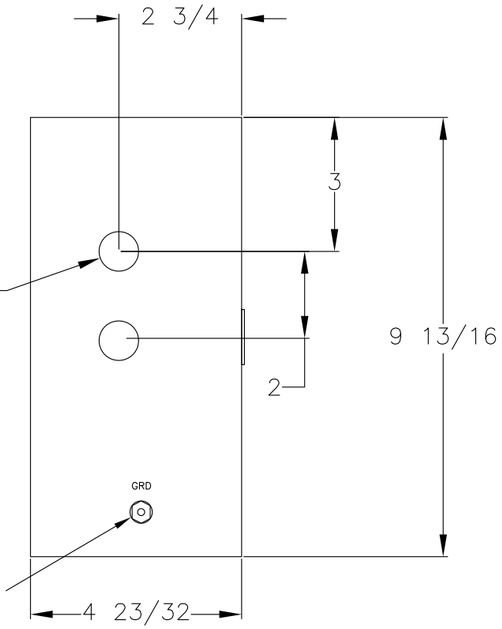
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

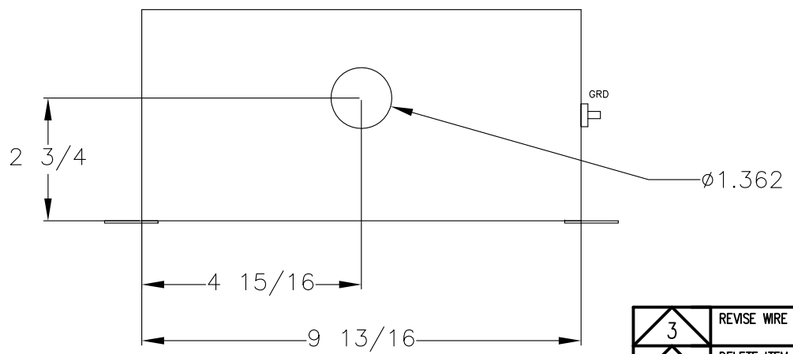
CENT, MAN











QTY	ITEM	PART NUMBER	PART NAME	DESCRIPTION
1	10	G0007244	NAMEPLATE, EMERGENCY STOP	
1	09	G0005325	EMERGENCY STOP BUTTON	
18	08	G0008573	TERMINAL BLOCK LABEL	
2	07	G0008571	TERMINAL BLOCK GROUND	BLOCK, TERM GND-2 COND GRN/YEL
4	06	G0004286	TERMINAL BLOCK END CLAMP	CLAMP, TERM BLOCK 10MM
8	05	G0008544	TERMINAL BLOCK DIVIDER	SEPARATOR, TERM BLK-2002 SERIES/ORANGE
16	04	G0008572	TERMINAL BLOCK	BLOCK, TERM-2 COND THRU 2002 SERIES/BLUE
2	03	G0003567	RAIL	RAIL, DIN-35mm X 7.5mm X 8.5
1	02	G0004278	ENCLOSURE	ENCLOSURE, SS-9.84X9.84X4.73 NEMA 4X
	01	16618-01	PARTS LIST FOR ENCLOSURE	ASSEMBLY COMPLETE

REF WS 14394-00-007
REF WS 14394-00-009
REF WS 14394-00-011
REF WS 14394-00-012
REF WS 14394-00-013
REF ELP 16593-00

REV	CHANGE	CKD	DATE
6	CHANGE TERMINAL LABELS LABELS TO NUMBERS ONLY	JWC MC	10/04/11
5	REMOVED THIRD SPARE TERMINAL BLOCK (WAS LABELED 7-SPARE). RENUMBERED TERMINAL BLOCKS TO MATCH WIRING SCHEMATIC. CORRECTED ITEM 04 QUANTITY.	DSD JWC	04/26/11
4	REMOVED ITEMS 09 & 10 (WERE G0007675 & 3875), NOW PART OF ITEM 02. CHANGED ITEMS 04-08 TO WAGO 2002, WERE G0007236, -7237, -7012, -7216 & -4520.		
	CORRECTED BOX DIMENSIONS. REVISED TERMINAL BLOCK NUMBERING, CHANGED TERMINAL BLOCK CONFIGURATION TO INCLUDE ONLY THREE SPARE TERMINALS.	DSD JWC	03/25/11
3	REVISE WIRE LABELS FOR SPEED SENSORS, OMIT G. A. REFERENCE	JWC JFS	07/13/09
2	DELETE ITEM 13 NOW SHOWN ON 16593-00, ADD REF ELP 16593-00	JWC JFS	03/24/09
1	ADD SECOND HOLE FOR SPEED SENSOR, ADD HOLE DIMENSIONS AND LOCATIONS	JWC JFS	01/27/09

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TITLE: DE-7200 BASE JUNCTION BOX ASSEMBLY

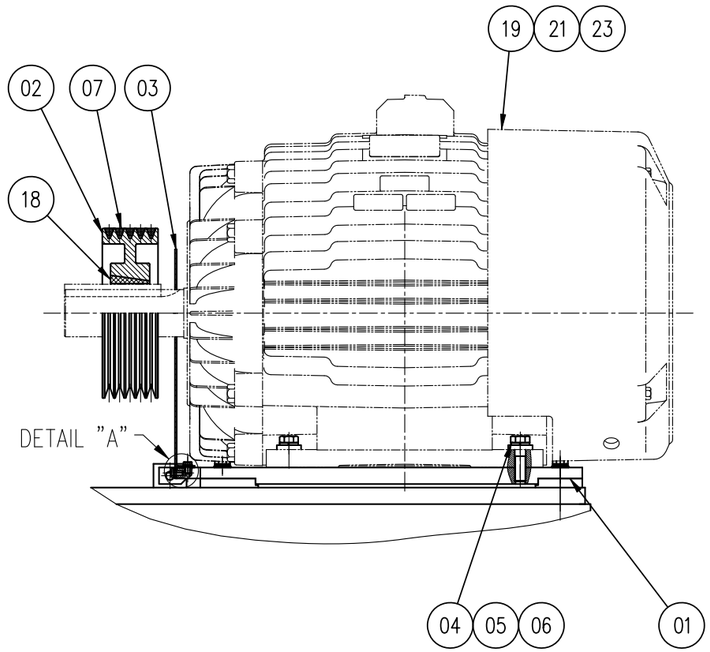
DWN JWC | CKD JFS | DATE 02/20/07 | SCALE NTS | REV 6

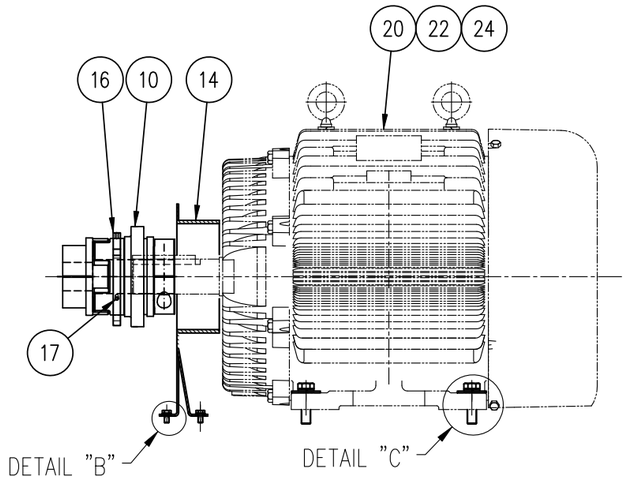
SHEET SIZE B | F C | N | DWN | CKD

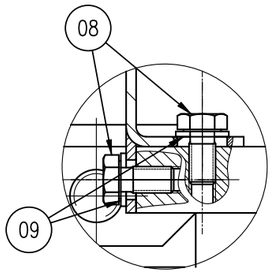
DRAWING NO. 16618-00

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

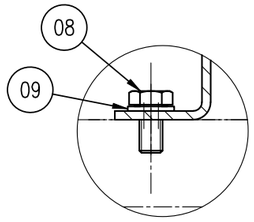
PUR,CENT,MAN







DETAIL "A"



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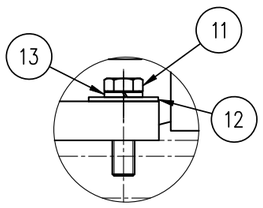

DETAIL "C"

			27	16621-27	575V DRIVE ASSEMBLY
			26	16621-26	460V DRIVE ASSEMBLY
			25	16621-25	380V DRIVE ASSEMBLY
1			24	G0009391	MOTOR, 575V 60Hp
1			23	G0009390	MOTOR, 575V 150Hp
	1		22	G0009208	MOTOR, 460V 60Hp
	1		21	G0009207	MOTOR, 460V 150Hp
		1	20	G0009524	MOTOR, 380V 60Hp
		1	19	G0009523	MOTOR, 380V 150Hp
1	1	1	18	G0009297	PULLEY BUSHING
			17		
			16		
			15		
1	1	1	14	G0007968	BACK DRIVE SHAFT GAURD
4	4	4	13	G0012129	LOCK WASHER
4	4	4	12	G0007967	FLAT WASHER
4	4	4	11	G0012130	HEX HEAD BOLT
1	1	1	10	G0008994	OVERLOAD CLUTCH/COUPLING
6	6	6	09	G0012501	FLAT WASHER
6	6	6	08	G0007756	HEX HEAD BOLT
5	5	5	07	G0007964	DRIVE BELT
4	4	4	06	G0003352	LOCK WASHER
4	4	4	05	G0007962	FLAT WASHER
4	4	4	04	G0007961	HEX HEAD BOLT
1	1	1	03	G0007960	MAIN DRIVE SHAFT GUARD
1	1	1	02	G0009296	V-BELT PULLEY
1	1	1	01	G0007957	MOTOR PLATE
QUANTITY			ITEM	PART NUMBER	DESCRIPTION/PART NAME

NOTE:
USE WITH UNITS CF005001 – CF005035

REF: 16590-00-005

REV			
9	CHANGED QUANTITIES FOR ITEMS 08 (WAS 3) AND 09 (WAS 3). ADDED ITEM 14. REMOVED ITEMS 16 AND 17. ADDED DETAIL B. CHANGED ITEMS 11 (WAS G0007966) AND 13 (WAS G0007734).	JMB	7/18/12
8	MODIFIED ITEM 16 (WAS 16669-01-001)	JMB	7/18/12
7	REMOVED DETAIL "B", REMOVED ITEM 14 (WAS G0007968), ITEMS 08 & 09 QTY WAS 6, CHANGED ITEM 06 (WAS G0007963), ADDED ITEMS 19-27.	JMB / SB	2/14/12
6	REMOVED ITEM 15, WAS G0007756; REMOVED ITEM 19, WAS G0007873; QUANTITY OF ITEM 08 WAS 3	JMB	12/22/11
5	ITEM 09 WAS G0007965 QTY 3, ITEM 16 WAS G0007969 QTY 3; MODIFIED BOM & BALOONS TO REFLECT CHANGES.	MCR / SB	10/24/11
4	ADDED ITEM 20; ADDED CUT VIEW OF PULLEY; 16590-00-003 WAS 16590-00	JMB	8/31/11
3	ITEM 02 WAS G0007958; ADDED ITEM 19.	CCS	7/22/2010
2	ADDED ITEMS 17 & 18.	CCS	3/1/2010
1	ITEM 10 WAS G0007870.	CCS	2/9/2010

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TITLE: MOTORS AND MECHANICAL DRIVE COMPONENTS PARTS LIST FOR DE-7200 CENTRIFUGE

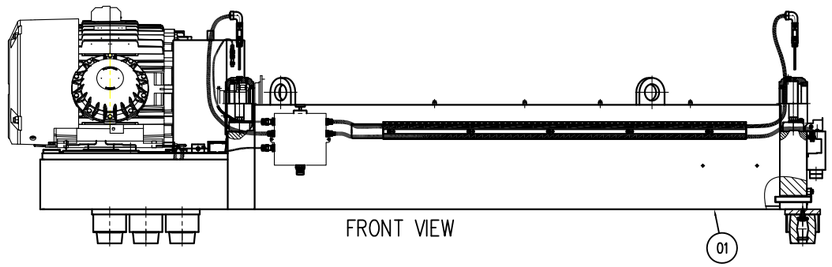
DWN CCS | CKD | DATE 2/27/07 | SCALE NTS | REV 9

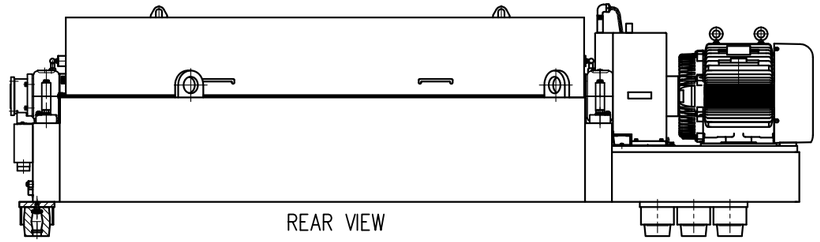
SHEET SIZE B | N | DWN | CKD

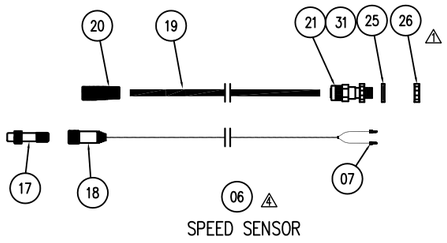
DRAWING NO. 16621-00

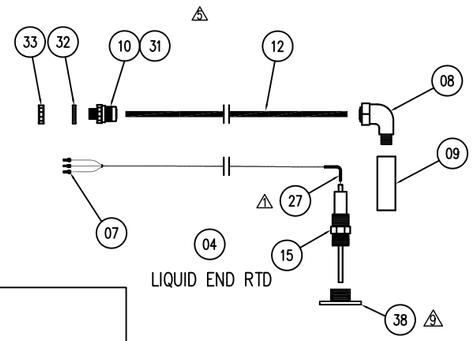
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

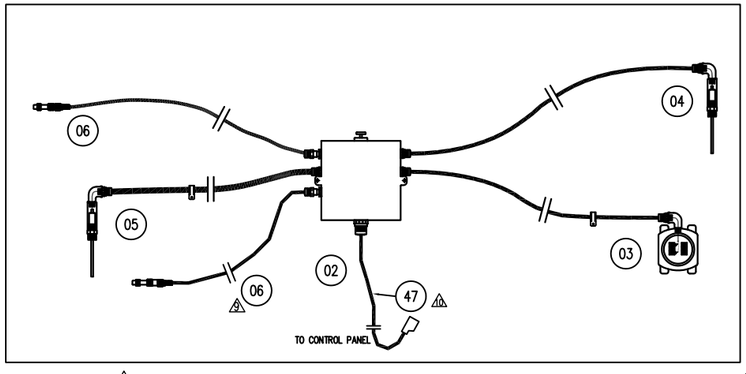
CENT, MAN

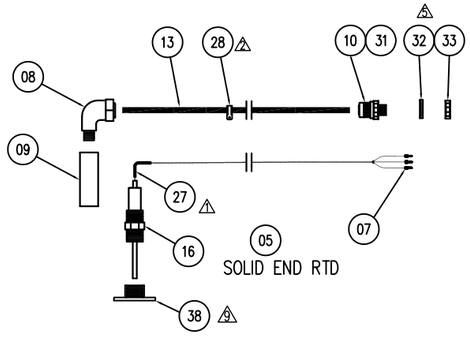


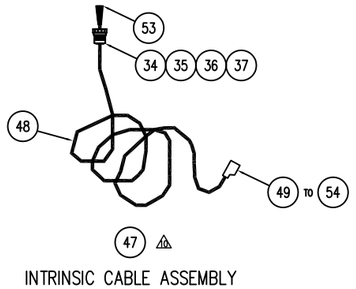


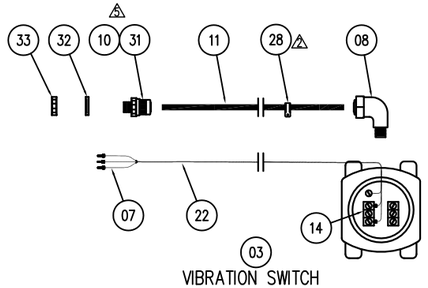












	QTY					ITEM	PART NAME	PART NUMBER
	2					54	FORK TERMINAL 18 AWG	PV18-8F-C
	17					53	FERRULE 18 AWG	G0003538
	1					52	MALE TERMINAL-CAGE CLAMP	G0007852
	1					51	HOOD SIDE ENTRY	G0007850
	1					50	PLUG HOOD COVER	G0007849
	1					49	CABLE GLAND (7-17 MM)	G0009238
	1					48	INTRINSIC CABLE 18AWG 18 COND (100 FT)	G0008403
	X				1	47	INTRINSIC CABLE ASSEMBLY	16593-47
						46	NOT USED	
						45	NOT USED	
						44	NOT USED	
						43	NOT USED	
						42	NOT USED	
						41	NOT USED	
						40	NOT USED	
						39	NOT USED	
		1	1			38	TEMPERATURE SENSOR MOUNTING BRACKET	17213-01
	1					37	LOCKNUT, COND 1.0 ZPL STL	TBS-143
	1					36	SEALING GASKET 1.0	G0009047
	1					35	BUSHING, INSULATED 1.0	G0009046
	1					34	CORD CONNECTOR 1.0 NPT (0.50-0.635)	G0009236
		1	1	1		33	LOCKNUT, COND 0.50 ZPL STL	G0008575
		1	1	1		32	SEALING GASKET 0.50	G0008574
		1	1	1		31	INSULATED BUSHING 0.50	PP1290
						30	LOCKNUT, BRASS 0.50 NPT-NPT	G0008725
						29	SPACER	16659-01-001
		1		1		28	CLAMP, CUSHION - 0.750" NPT, 0.406" MOUNTING	G0008027
		1	1			27	SLEEVE,#8-SILICONE RUBBER 6" LENGTH	G0008035
	1					26	LOCKNUT, 1/2" NPT - BRASS	G0007994
	1					25	GASKET, SEALING - 0.500" NPT	G0007993
						24	NOT USED	
						23	NOT USED	
					1	22	WIRE, 3 COND 18 AWG SHIELDED X 125"	G0007941
	1					21	CABLE GLAND, XP, 1/2" NPT	G0004444
	1					20	HEAT SHRINK TUBING, 2"	G0007940
	1					19	ARMOR JACKET, .313 ID X 46"	G0007939
	1					18	CABLE, SPEED SENSOR, WITH FITTING, 2 M LONG	G0007862
	1					17	SPEED SENSOR	G0007861
		1				16	RTD SENSOR, BEARING, 5" 316SS 60" WIRE	G0007712
				1		15	RTD SENSOR, BEARING, 5" 316SS 140" WIRE	G0007265
					1	14	VIBRATION SWITCH	G0003015
		1				13	CONDUIT, LIQUID TIGHT - 1/2" X 38"	G0007938
			1			12	CONDUIT, LIQUID TIGHT - 1/2" X 122"	G0007937
				1		11	CONDUIT, LIQUID TIGHT - 1/2" X 103"	G0007936
			1	1	1	10	FITTING, LIQUID TIGHT, 1/2" NPT, STRAIGHT	CRH-LT50
			1	1		09	COUPLING, PIPE - FULL, 1/2" NPT, SS	CPLG-50-S4
			1	1	1	08	90 DEGREE ELBOW, LIQUID TIGHT	CRH-LT5090
		2	3	3	3	07	FERRULE	G0002377
		X			2	06	SPEED SENSOR ASSY-BOWL & CONVEYOR MOTOR	16593-06
			X		1	05	SOLID END RTD ASSY	16593-05
				X	1	04	LIQUID END RTD ASSY	16593-04
					X	03	VIBRATION SWITCH ASSY	16593-03
					1	02	JUNCTION BOX, SENSOR ELECTRONICS ASSY	16618-01
					X	01	DE-7200 ROTATING ASSY ELECTICAL COMPONENT KIT	G0007702

REF: W.S. #14394-00-007
REF: W.S. #14394-00-009 10
REF: W.S. #14394-00-011
REF: W.S. #14394-00-012
REF: W.S. #14394-00-013 7
STARTED ON DE-7200 UNIT #CF5001
REV 4 STARTED ON DE-7200 UNIT #CF5036-X

REV	CHANGE	CKD	DATE
10	REVISE TITLE BLOCK WORDING (WAS BASE SENSOR SYSTEM), ADD ITEMS 47-54, REVISE DISTRIBUTION LIST (WAS CENT,GERMAN), REVISE 01 DESCRIPTION (WAS "BASE ELECTRICAL")	JFS	03/30/10
9	DELETE ITEM 45 (SPEED SENSOR ASSY) REPLACED BY IDENTICAL ITEM 06, OMIT ITEM 46 (WAS ARMOR JACKET), OMIT MOTORS ITEMS 23,24,41,42,43 AND 44 (SHOWN ON 16621-09)	JFS	01/29/10
8	OMIT ITEMS 39 AND 40 (WERE COMPONENT KITS AT 380V & 575V) ONLY ONE KIT REQUIRED USE ITEM 01 FOR ALL VOLTAGES, ADD MS REFERENCES	JFS	02/15/12
7	ADD ITEMS 38 TO 46, OMIT ONE ITEM 06, ADD SECOND VIEW OF ROTATING ASEMBLY, CHANGE QTY OF ITEMS 29 AND 30 (WAS COLUMN 04-1 AND 1)	JFS	11/02/10
6	ADD ITEMS 36 AND 37	JFS	03/30/10
5	DELETE VOLTAGE REFERENCE ON TITLE BLOCK, REVISE W.S. REFERENCE TO SERIES (WAS ONLY 14394-00-009)	JFS	01/29/10
4	REVISE ITEM 34 (WAS G0007933)	JFS	10/07/09
3	ADD ITEMS 32, 33, 34 AND 35	JFS	03/23/09
2	ADD ITEM 31, ADD SECOND SPEED SENSOR ITEM 06 (WAS ONE)	JFS	01/27/09
1	ADDED #25, 26 AND 27	JFS	03/08/07
REV	CHANGE	CKD	DATE

REV	CHANGE	CKD	DATE
3	ADDED ITEMS 29 & 30	JFS	07/23/08
2	ITEM 11 WAS 106", ITEM #12 WAS 124", ITEM #13 WAS 42" AND ADDED ITEM #28	SDB	03/26/07
1	ADDED #25, 26 AND 27	JFS	03/08/07
REV	CHANGE	CKD	DATE

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TITLE: ELECTRICAL PARTS LIST FOR DE-7200 CENTRIFUGE INTRINSIC WIRING SYSTEM

DWN MS | CKD JFS | DATE 02/14/07 | SCALE NONE | REV 10

SHEET SIZE C | N | DWN | F C | CKD

DRAWING NO. 16593-00

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT,BOM,MAN

QTY	ITEM	PART NUMBER	DESCRIPTION
3	13	G0008184	BOLT – USE WITH COMBINATION PLATE
3	12	G0008183	COMBINATION PLATE – HOLDS CONVEYOR TO BOWL
1	11	G0008815	TAPER PIN REAMER
1	10	16748–01	FEED & SOLID DISCHARGE REPLACEMENT TOOL
2	09	G0008718	EYE BOLT – LIFT LIQUID END BOWL HEAD
2	08	G0008717	EYE BOLT – REMOVE CONVEYOR FROM BOWL
2	07	G0008709	JACK BOLT – REMOVE CONV. BEARING FROM HUB – REMOVE HUB FROM THRUST RING ON L.E. MAIN BEARING
2	06	G0008708	JACK BOLT – REMOVE BOWL DRIVE SHEAVE/CONV. BEARING HUB
2	05	G0008707	JACK BOLT – REMOVE CONVEYOR GEAR BOX OUTPUT SHAFT HUB
1	04	16954–01	CONVEYOR SUPPORT – CONVEYOR HORIZONTAL REMOVAL
2	03	G0002559	M16 X 2.0 NUT – REMOVE GEAR BOX
2	02	G0008706	JACK BOLT – REMOVE LIQUID END BOWL HEAD
	01	TOOL KIT ASSEMBLY	ASSEMBLY COMPLETE

REF: 16590–00

REV	CHANGE	CKD	DATE

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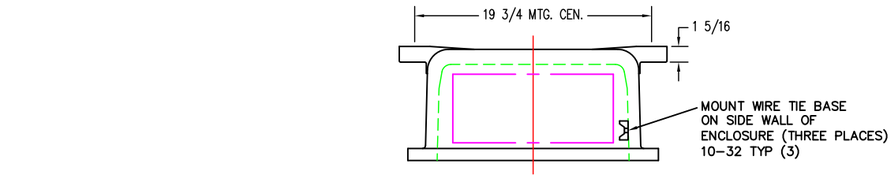
TITLE
TOOL KIT–REPAIR
DE–7200 CENTRIFUGE

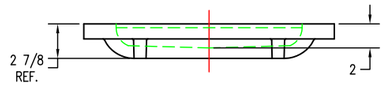
DWN	CKD	DATE	SCALE	REV
CCS		5/16/08	1:1	

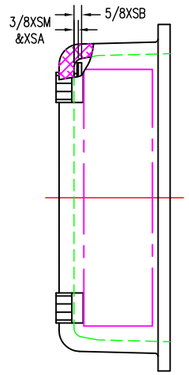
SHEET SIZE		DWN	DRAWING NO.
A	N	CKD	16798–00
	F C		

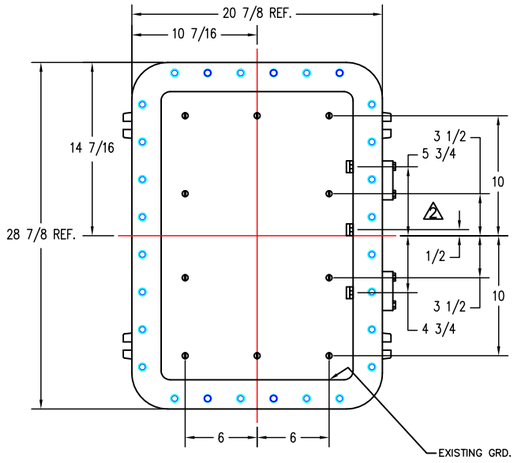
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

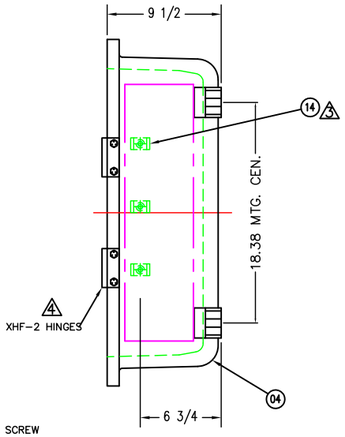
CENT

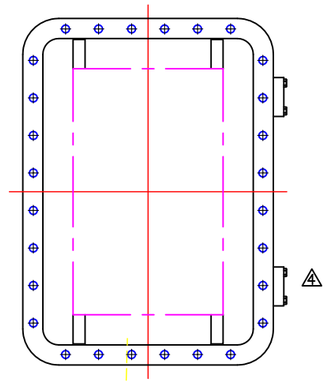








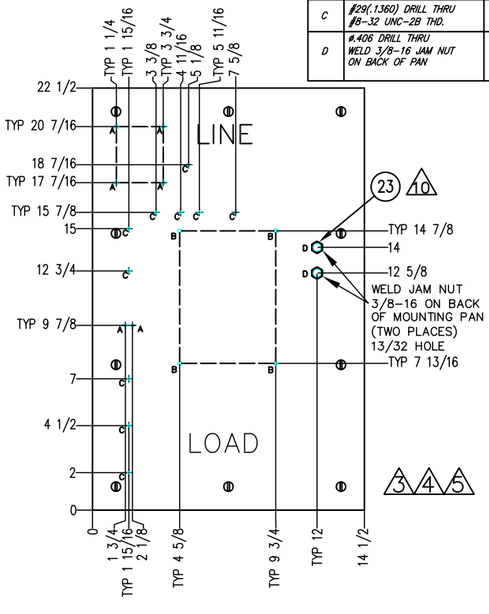




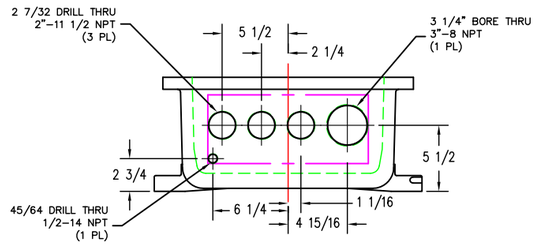
16X24X2 COVER

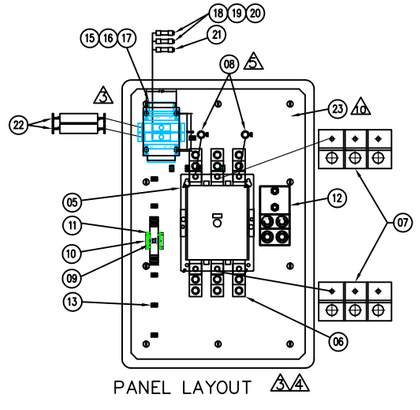
HOLE	DRILLING	QTY.
A	#21(.1590) DRILL THRU #10-32 UNF-2B THD.	6
B	#.250 DRILL THRU WELD 1/4-20 HEAVY NUT ON BACK OF PAN	4
C	#29(.1360) DRILL THRU #8-32 UNC-2B THD.	10
D	#.406 DRILL THRU WELD 3/8-16 JAM NUT ON BACK OF PAN	2

9



NOT TO SCALE





PANEL LAYOUT 3 4

REF. EL # 14394-00-009

4 NOTES
1) HINGE ON RIGHT SIDE
2) POWDER COAT PHENOLIC BEIGE

	QTY		ITEM	PART NUMBER	PART NAME	DESCRIPTION
10	2	2	24	G0002619	WELD NUT 3/8-16 SST	
10	1	1	23	G0012659	MOUNTING PLATE 16 X 24	GALV STEEL
	1	1	22	G0002874	FUSE COVER/PULLER	FOR REPLACEMENT
	1	1	21	G0002926	SECONDARY FUSE 120 V	1.25A FUSE
	2		20	G0008999	PRIMARY FUSE 575/600 V	4/10 A FUSE TIME DELAY
		2	19	G0004195	PRIMARY FUSE 460/480 V	1/2 A FUSE TIME DELAY
			18	G0008998	PRIMARY FUSE 380/400 V	6/10 A FUSE TIME DELAY
	1		17	G0009000	CONTROL TRANSFORMER	100VA 600/120
		1	16	G0002481	CONTROL TRANSFORMER	100VA 480/120
			15	G0002482	CONTROL TRANSFORMER	100VA 380/115
6	3	3	14	G0003519	SCREW STYLE WIRE TIE DOWN LARGE	
	10	10	13	PAN-TM3S10-C	SCREW STYLE WIRE TIE DOWN SMALL	
	1	1	12	G0007945	GROUNDING LUG	
	2	2	11	G0007012	TERMINAL END BLOCK	6MM
	2	2	10	G0006292	DIN RAIL	35MM X 7.5MM X 1.5" ZPL STL
8 7	1	1	09	G0009286	INTRINSIC BARRIER	
	2	2	08	G0007694	CONTROL CIRCUIT TERMINAL	
	2	2	07	G0007693	TOUCH PROOF COVERS	
	6	6	06	G0007692	TERMINAL LUGS	(2) #4-350 MCM
	1	1	05	G0007691	CONTACTOR 350A	
	1	1	04	G0007835	ENCLOSURE 16 X 24 X 08	EXPLOSIONPROOF-S9060 PHENOLIC BEIGE
			03	16607-03	575/600V CONTROL PANEL	ASSEMBLY COMPLETE
			02	16607-02	460/480V CONTROL PANEL	ASSEMBLY COMPLETE
			01	16607-01	380/400V CONTROL PANEL	ASSEMBLY COMPLETE

REV	CHANGE	CKD	DATE
10	SEE PAPER SPACE FOR REV 1-8, ADD ITEM 23 (WAS PREVIOUSLY INCLUDED WITH ITEM 04) ADD ITEM 24	JWC JFS	05/29/12
9	REVISE MOUNTING HOLE B (WAS 5/16-18)	JWC JFS	11/09/10

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TITLE: EXPLOSION PROOF ENCLOSURE ASSEMBLY FOR POWER SUPPLY TO DE-7200 CENTRIFUGE

DWN JFS | CKD MC | DATE 1/25/07 | SCALE 1:10 | REV 10

SHEET SIZE C | F N | DWN KWJ 1/25/07 | CKD JFS 1/25/07

DRAWING NO. 16607-00

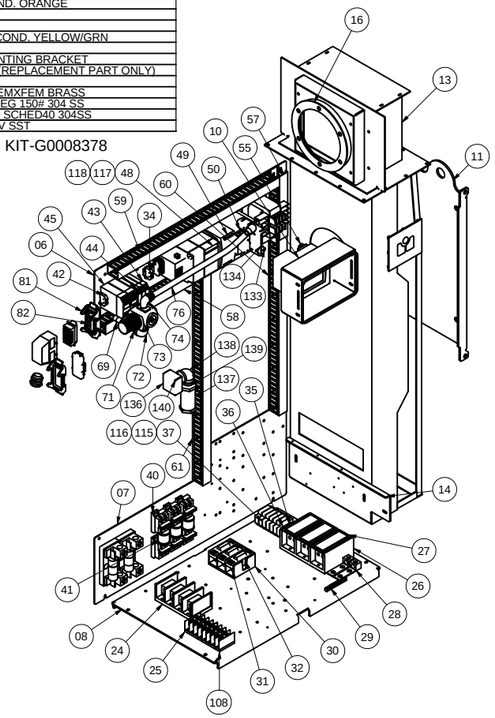
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

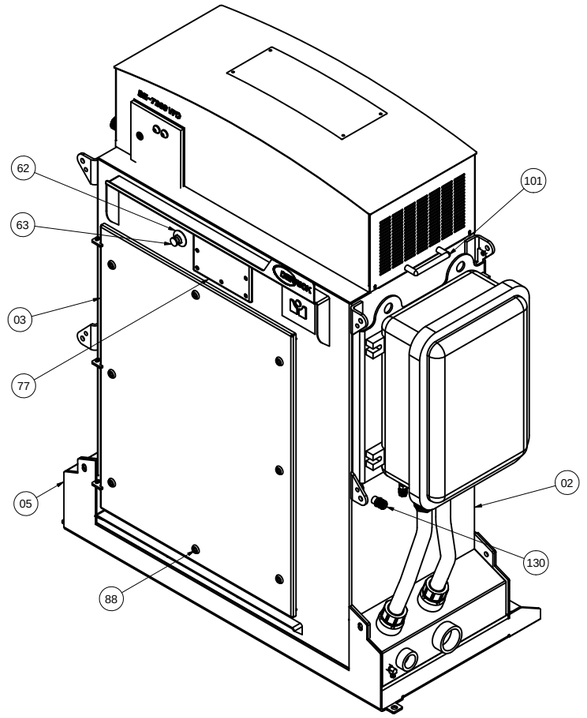
CENT, BOM

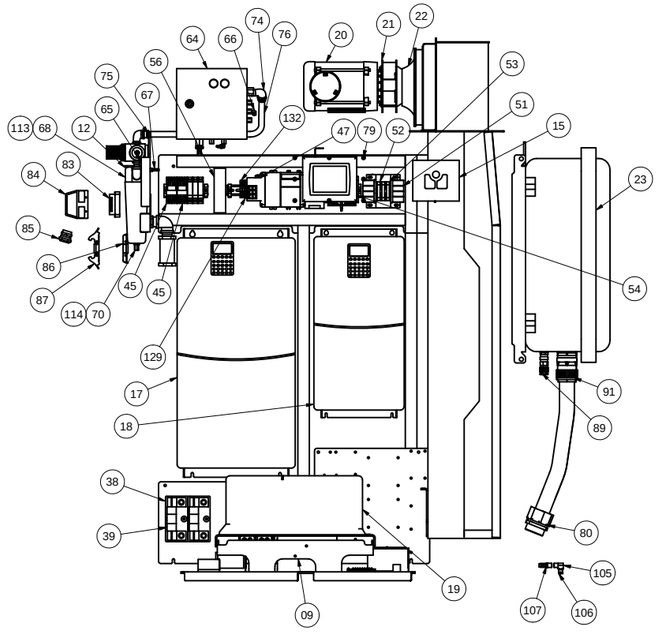
ITEM	QTY	PART NUMBER	DESCRIPTION
01	X	16472-01-002	ASSEMBLY COMPLETE
02	1	16396-01-008	ENCLOSURE ASSEMBLY
03	1	16400-01-003	DOOR ASSEMBLY
04	1	16401-01-002	COVER ASSEMBLY
05	1	16402-01-001	STAND ASSEMBLY
06	1	16404-01-004	COMPONENT PANEL (UPPER)
07	1	16404-02-004	COMPONENT PANEL (LOWER)
08	1	16404-03-004	COMPONENT PANEL (BOTTOM)
09	1	16404-01-003	COMPONENT MOUNT ASSY
10	1	16405-01	DISPLAY SCREEN MOUNT
11	1	16597-01	ENCLOSURE MOUNTING BRACKET
12	1	16598-01	AIR FILTER MOUNTING BRACKET
13	1	G0002881	AIR CONDITIONER, 12,000 BTU/HR 460/60/3
14	1	16403-01	A/C SUPPORT ANGLE
15	1	17006-01	INDUSTRIAL MOUSE W/CABLE
16	1	15197-01-003	INLET CONE EXTENSION
17	1	G0007573	DRIVE, 150 HP 460VAC 60 HZ
18	1	G0007690	DRIVE, 60 HP 460VAC 60 HZ
19	1	G0007689	DRIVE, 30 HP 460VAC 60 HZ
20	1	G0007588	AIR CONDITIONER COOLING MOTOR
21	1	G0002603	FAN WHEEL, 8" BACKWARD CURVED
22	1	G0002604	INLET CONE
23	1	16607-02	EX-PROOF ENCLOSURE
24	1	G0008966	BLOCK,PWR DISTR-4 POLE (1)#4-500MCM
25	2	G0008891	BLOCK,PWR DISTR-3 POLE 2/0-#14
26	1	G0008941	POWER DIST. BLOCK, INCOMING
27	3	G0008942	POWER DIST. BLOCK COVER
28	2	G0007213	GROUND LUG, INCOMING
29	1	G0005309	GROUND BUS BAR, INCOMING 7PT
30	1	G0007221	FUSE BLOCK, 60 AMP 3P CLASS J
31	3	G0007698	FUSE, 60 AMP CLASS J
32	3	G0007223	FUSE COVER, INDICATING
33	1	G0007998	DIN RAIL, 35MM X 5 1/2
34	6	G0008507	TERMINAL BLOCK END BARRIER - 6mm
35	7	G0008562	TERMINAL BLOCK GREY 4PT
36	1	G0009839	TERMINAL BLOCK JUMPER
37	2	G0007214	FUSE BLOCK, 30 AMP 3P CLASS CC
38	2	G0007224	FUSE BLOCK, 200 AMP 1P CLASS J
39	2	G0007225	FUSE, 150 AMP CLASS J TYPE HSJ
40	6	G0007631	FUSE HOLDER, 400 AMP 1P CLASS T
41	3	G0007632	FUSE, 225 AMP CLASS T
42	1	G0007645	DIN RAIL, 35MM X 5
43	1	G0009286	BARRIER, INTRINSIC SAFE-VIBR SWITCH+E-STOP
44	2	G0007918	BARRIER, INTRINSIC SAFE-RTD SENSOR
45	2	17244-02	BARRIER, INTRINSIC SAFE-SPEED SENSOR
46	1	G0007999	DIN RAIL, 35MM X 16
47	1	G0007231	ETHERNET SWITCH, 6 PORT
48	1	G0007228	PLC, COMPACTLOGIX PROCCESSOR
49	1	G0003552	POWER SUPPLY, 24VDC, 5 AMP
50	1	G0003504	SURGE SUPPRESSOR, 120V 60HZ
51	1	G0003494	TRANSFORMER, 500VA, 460V PRI/120V SEC
52	2	G0002910	FUSE, TIME DELAY 2.5A 600VAC
53	1	G0002911	FUSE, TIME DELAY 7.0A 250VAC
54	1	G0007976	OPERATOR INTERFACE - 120VAC PROGRAMMED
55	1	17006-02	USB CABLE ASSEMBLY
56	1	G0008000	WIRE DUCT, 1/2 X 2 X 6
57	1	G0008001	WIRE DUCT, 1/2 X 2 X 10 1/2
58	1	G0008002	WIRE DUCT, 1/2 X 2 X 33 1/8
59	1	G0007338	WIRE DUCT, 1/2 X 2 X 30 3/4
60	1	G0007650	WIRE DUCT, 1/2 X 2 X 28 7/8
61	1	G0008010	WIRE DUCT, 1/2 X 2 X 34 3/8
62	1	G0007244	NAMEPLATE, EMERGENCY STOP
63	1	G0005325	BUTTON, EMERGENCY STOP
64	1	G0007865	PURGE UNIT W/RELIEF VALVE
65	1	G0008006	RELIEF VALVE (SERIAL # OF PURGE REQUIRED)
66	2	IMP-116B-02X02	1/8 90 DEG STREET ELBOW, BRASS
67	2	G0004679	1/8 X 3/16 HOSE BARB
68	1	G0003565	AIR FILTER, DX
69	1	NPLE-50X200S-4	1/2 X 2 PIPE NIPPLE, SST
70	1	G0002300	AIR FILTER, BX
71	2	G0002716	1/2 X 1 1/2 PIPE NIPPLE, SST
72	1	G0002714	1/2 90 DEG. ELBOW, SST
73	1	G0009927	AIR REGULATOR
74	2	G0008003	1/2 90 DEG STREET ELBOW, BRASS
75	3	G0008004	1/2 X 1/2 HOSE BARB
76	1	G0008009	AIR HOSE
77	1	15181-01-001	DISPLAY SCREEN PROTECTIVE COVER
78	1	G0004364	O-RING, PROTECTIVE COVER
79	8	G0008007	1/4-20 SEALING PAN HEAD SCREW
80	2	G0008964	2 1/2" CORD FITTING
81	1	G0007846	CONNECTOR HOUSING
82	1	G0007848	INSERT TERMINAL, FEMALE
83	1	G0007852	INSERT TERMINAL, MALE
84	1	G0007850	CONNECTOR HOOD
85	1	G0009238	CABLE GLAND, HOOD (7-17MM)
86	1	G0007851	CONNECTOR COVER, HOUSING
87	1	G0007849	CONNECTOR COVER, HOOD
88	8	G0008005	DOOR LATCH
89	1	G0004444	1/2" CABLE GLAND XP
90	1	G0004418	1/2" CABLE FITTING (.25-.375" OD)
91	2	16627-01-001	CABLE ASSEMBLY
92	35	G0007252	WIRE DUCT FASTENER MOUNT
93	28	PAN-TM3S10-C	WIRE SADDLE, SMALL
94	13	G0003519	WIRE SADDLE, MEDIUM
95	1	G0009727	CABLE, GEXOL 16 AWG-6C (6 FT) ASSY W/ XP GLAND
96	1	G0007951	ETHERNET CABLE X 8 1/2 (ETH SW-PLC)
97	1	G0007952	ETHERNET CABLE X 62 (ETH SW-PNL VIEW)
98	1	G0007953	ETHERNET CABLE X 84 (ETH SW-60HP)
99	1	G0007954	ETHERNET CABLE X 104 (ETH SW-150HP)
100	1	G0007955	ETHERNET CABLE X 178 (ETH SW-30HP)
101	2	G0004970	HANDLE,COVER
102	2	G0007701	LUG, CRIMP #6 AWG
103	6	G0007633	LUG, CRIMP #1 AWG
104	2	G0007256	LUG, CRIMP #2 AWG
105	1	IMP-116B-04X04	1/4 90 DEG STREET ELBOW, BRASS
106	1	CRH-ECD-284	1/4 DRAIN PLUG
107	1	G0008267	1/2 X 1/4 NPT HOSE BARB
108	2	G0008892	BLOCK,PWR DISTR-1 POLE 2/0-#14 W/ADDER
109	8	G0008893	COVER,DISTR BLOCK-FOR G0008891/8892
110	4	G0008890	COVER,DISTR BLOCK-FOR G0008966
111			
112	1	G0007995	COMPACT FLASH MEMORY CARD
113	1	G0002301	AIR ELEMENT, DX (REPLACEMENT ONLY)
114	1	G0002302	AIR ELEMENT, BX (REPLACEMENT ONLY)
115	3	G0008792	FUSE, TIME DELAY-3.0 AMP CLASS CC
116	3	G0003493	FUSE, TIME DELAY-15 AMP CLASS CC
117	1	G0007229	PLC POWER SUPPLY
118	1	G0007230	PLC END BARRIER
119	1	G0002873	COVER, CONTROL TRANSFORMER
120	1	G0002874	FUSE PULLER, CONTROL TRANFORMER
121	2	SHPP-100	1" NPT PLUG
122	1	SHPP-150	1 1/2" NPT PLUG
123	3	SHPP-200	2" NPT PLUG
124	1	SHPP-250	2 1/2" NPT PLUG
125	1	G0007258	REDUCER, 3" TO 2" NPT

ITEM	QTY	PART NUMBER	DESCRIPTION
126	1	TBS2535	CORD FITTING, 3/4"
127	1	CRH-EL296	CORD FITTING, 90 DEGREE
128	1	G0009272	SENSOR CABLE
129	8	G0008563	TERMINAL BLOCK-4 COND. ORANGE
130	1	G0002711	1/2" CORD FITTING
131	1	G0008349	PLC BATTERY
132	3	G0009324	TERMINAL BLOCK-4PT COND. YELLOW/GRN
133	1	G0009974	SENSOR, RTD
134	1	17420-01	A/C THERMOSTAT MOUNTING BRACKET
135	1	G0009291	A/C EVAPORATOR FAN (REPLACEMENT PART ONLY)
136	1	G0012168	COVER, WATER/DUST
137	1	G0012122	VALVE,CHECK 1" NPT FEMXFEM BRASS
138	1	S4PE-EL-100	ELBOW,PIPE-1" FPT 90DEG 150# 304 SS
139	1	G0012167	NIPPLE, PIPE-1"XCLOSE SCHED40 304SS
140	1	G0012166	ARRESTOR, SPARK UNIV SST

SPECIAL TOOL: PURGE PRESSURE MEASURING KIT-G0008378







REV	DESCRIPTION	BY	DATE
1	ITEM 30 WAS G0007217; ITEM 31 WAS G0007218; ADDED ITEMS.	CCS	8/13/2007
2	ITEM 03 WAS 16400-01-001; QUANTITY WAS 5 ON ITEM 88.	CCS	8/23/2007
3	ADDED ITEMS 112 THRU 116,ADDED NOTE	CCS	5/12/2008
4	ITEM 15 WAS 16609-01; ITEM 55 WAS G0007863; ITEM 22 WAS 16622-01.	CCS	11/3/2008
5	ITEM 54 WAS G0007245; ITEM 24 WAS G0008261; ITEM 25 WAS G0008262; ITEM 26 WAS G0007210; ITEM 27 WAS G0007211; ITEM 109 WAS G0008264; ITEM 110 WAS G0008265; ITEM 111 WAS G0008266; ITEM 91 WAS 16627-01; ITEM 80 WAS G0003529.	CCS	12/18/2008
6	ADDED ITEMS 117-132; ITEM 43 WAS G0007232; ITEM 44 WAS G0007233; ITEM 45 WAS G0007234.	CCS	2/4/2010
7	ITEM 16 WAS 15197-01-001 PER DRR#2563; ADDED ITEMS 133, 134, & 135; ITEM 73 WAS G0009927; ITEM 71 & 71 QTY WAS 1; ITEM 74 QTY WAS 2	DJK	5/5/2011
8	ADDED ITEMS 136-140	BKS	8/5/11
9	MODIFIED ITEMS 29 (WAS G0007610), 34 (WAS G0007012), 35 (WAS G0007216), 36 (WAS G0007237), 54 (WAS G0008825), 128 (WAS G0007868), 130 (WAS G0008572), 131 (WAS G0008544), 132 (WAS G0008571) AND 133 (WAS G0009973). CHANGED QTY ON ITEMS 90 (WAS 2), 129 (WAS 3) AND 132 (WAS 1).	JMB	4/11/12
10	ITEM 95 WAS G0002967; 111 WAS G0002966; QTY ITEM 129 WAS 3; UPDATED DESCRIPTION OF 89,90;108	DMM	7/10/12
11	ITEM 02: 16396-01-008 WAS 16396-01-003	EJR	10/8/12

GEOMETRIC CHARACTERISTIC SYMBOLS

FLATNESS	▱
STRAIGHTNESS	—
ROUNDNESS	○
CYLINDRICITY	⌭
PARALLELISM	//
PERPENDICULARITY	⊥
ANGULARITY	∠
RUNOUT	↗
POSITION	⌖
CONCENTRICITY	◎
SYMMETRY	⌯

TOLERANCES UNLESS SPECIFIED

DEC	MM
(2) PLACE DEC. +/- .0100	+/- .254
(3) PLACE DEC. +/- .0050	+/- .127
(4) PLACE DEC. +/- .0002	+/- .005
ANGLES..... +/- .1°	+/- .1°

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DRAWN	fjmonroe	4/11/2007
CHECKED	CCSMITH	5/9/2007
QA		
MFG		
APPROVED		

DERRICK® CORPORATION

TITLE

CONTROL ENCLOSURE ASSEMBLY
DE-7200 EX-PROOF 460/480/60/3

SIZE	FILECOPY	DWG NO	REV
D	Y	16472-00-002	11

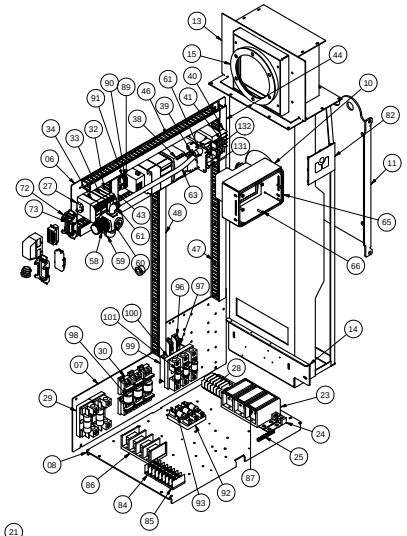
SCALE 1:10 SHEET 1 OF 1

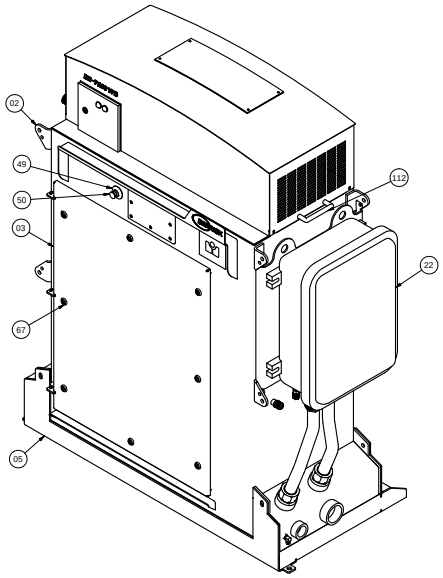
CENT,MAN,C-RM

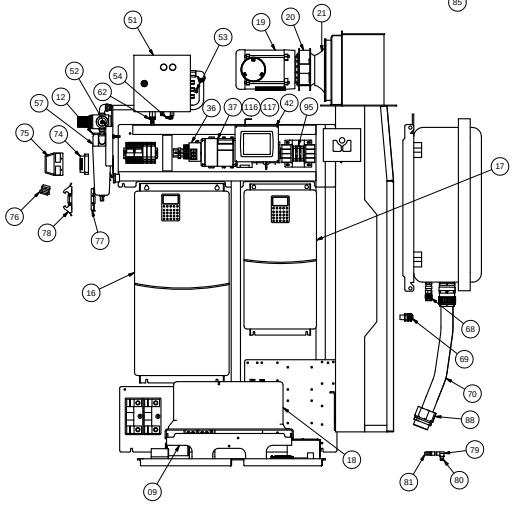
ITEM	QTY	DRAWING NUMBER	DESCRIPTION
01	X	16472-01-003	ASSEMBLY COMPLETE
02	1	16396-01-003	ENCLOSURE ASSEMBLY
03	1	16400-01-003	DOOR ASSEMBLY
04	1	16401-01-002	COVER ASSEMBLY
05	1	16402-01-001	STAND ASSEMBLY
06	1	16404-01-004	COMPONENT PANEL (UPPER)
07	1	16404-02-004	COMPONENT PANEL (LOWER)
08	1	16404-03-004	COMPONENT PANEL (BOTTOM)
09	1	16404-01-003	COMPONENT MOUNT ASSEMBLY
10	1	16405-01	DISPLAY SCREEN MOUNT
11	1	16597-01	ENCLOSURE MOUNTING BRACKET
12	1	16598-01	AIR FILTER MOUNTING BRACKET
13	1	G0002881	AIR CONDITIONER, 12,000 BTU/HR 460/60/3
14	1	16403-01	A/C SUPPORT ANGLE
15	1	15197-01-003	INLET CONE EXTENSION
16	1	G0009358	DRIVE, 150 HP 380VAC 50HZ
17	1	G0009359	DRIVE, 60 HP 380VAC 50HZ
18	1	G0009360	DRIVE, 30 HP 380VAC 50HZ
19	1	G0007588	AIR CONDITIONER COOLING MOTOR
20	1	G0002603	CANWHEEL, 8" BACKWARD CURVED
21	1	G0002604	INLET CONE
22	1	16607-01	EX-PROOF ENCLOSURE
23	1	G0008941	POWER DIST. BLOCK, INCOMING
24	2	G0007213	GROUND LUG, INCOMING
25	1	G0005309	GROUND BUS BAR, INCOMING
26	1	G0007998	DIN RAIL, 35MM X 5 1/2
27	6	G0008507	TERMINAL BLOCK END BARRIER
28	2	G0007214	FUSE BLOCK, 30 AMP 3P CLASS CC
29	2	G0007224	FUSE BLOCK, 200 AMP 1P CLASS J
30	6	G0007631	FUSE HOLDER, 400 AMP 1P CLASS T
31	1	G0007645	DIN RAIL, 35MM X 5
32	1	G0009286	BARRIER, INTRINSIC SAFE-VIBR SWITH + E-STOP
33	2	G0007918	BARRIER, INTRINSIC SAFE-RTD SENSOR
34	2	17244-02	BARRIER, INTRINSIC SAFE-SPEED SENSOR
35	1	G0007999	DIN RAIL, 35MM X 16
36	1	G0007231	ETHERNET SWITCH, 8 PORT
37	1	G0007229	PLC, COMPACTLOGIX PROCESSOR
38	1	G0003552	POWER SUPPLY, 24VDC 5 AMP
39	1	G0003504	SURGE SUPPRESSOR, 120V 60HZ
40	1	G0008890	TRANSFORMER, 50VA, 400V PRI/115V SEC
41	1	G0002911	FUSE, TIME DELAY-7.0A 250VAC
42	1	G0007976	OPERATOR INTERFACE-120VAC - PPROGRAMMED
43	1	G0008000	WIRE DUCT, 1 1/2 X 2 X 6
44	1	G0008001	WIRE DUCT, 1 1/2 X 2 X 10 1/2
45	1	G0008002	WIRE DUCT, 1 1/2 X 2 X 33 1/8
46	1	G0007338	WIRE DUCT, 1 1/2 X 2 X 30 3/4
47	1	G0007650	WIRE DUCT, 1 1/2 X 2 X 28 7/8
48	1	G0008010	WIRE DUCT, 1 1/2 X 2 X 34 3/8
49	1	G0007244	NAMEPLATE, EMERGENCY STOP
50	1	G0005325	BUTTON, EMERGENCY STOP
51	1	G0007865	PURGE UNIT W/RELIEF VALVE
52	1	G0008006	RELIEF VALVE (SERIAL # OF PURGE REQUIRED)
53	2	MP-116B-02X02	1/8 90 DEG STREET ELBOW, BRASS
54	2	G0004679	1/8 X 3/16 HOSE BARB
55	1	G0003565	AIR FILTER, DX
56	1	NPLE-50X200S-4	1/2 X 2 PIPE NIPPLE, SST
57	1	G0002300	AIR FILTER, BX
58	2	G0002716	1/2 X 1 1/2 PIPE NIPPLE, SST
59	1	G0002714	1/2 90 DEG ELBOW, SST
60	1	G0009927	AIR REGULATOR
61	2	G0008003	1/2 90 DEG STREET ELBOW, BRASS
62	3	G0008004	1/2 X 1/2 HOSE BARB
63	1	G0008009	AIR HOSE
64	1	15181-01-001	DISPLAY SCREEN PROTECTIVE COVER
65	1	G0004364	O-RING, PROTECTIVE COVER
66	8	G0008007	1/4-20 SEALING PAN HEAD SCREW
67	8	G0008005	DOOR LATCH
68	1	G0004444	1/2" CABLE GLAND
69	2	G0002711	1/2" CABLE FITTING
70	2	16627-01-001	CABLE ASSEMBLY
71	1	G009767	CABLE, GEXOL 16 AWG-6C (6FT) ASSY W/ XP GLAND
72	1	G0007846	CONNECTOR HOUSING
73	1	G0007848	INSERT TERMINAL, FEMALE
74	1	G0007852	INSERT TERMINAL, MALE
75	1	G0007850	CONNECTOR HOOD
76	1	G0009238	CABLE GLAND, HOOD (7-17MM)
77	1	G0007851	CONNECTOR COVER, HOUSING
78	1	G0007849	CONNECTOR COVER, HOOD
79	1	MP-116B-04X04	1/4 90 DEG STREET ELBOW, BRASS
80	1	CRH-ECD-284	1/4 DRAIN PLUG
81	1	G0008267	1/2 X 1/4 NPT HOSE BARB
82	1	17006-01	INDUSTRIAL MOUSE W/CABLE
83	1	17006-02	CABLE ASSEMBLY
84	2	G0008891	BLOCK, POWER DISTR-3 POLE 2/0#14
85	2	G0008892	BLOCK, POWER DISTR-3 POLE 2/0 #14 W/ADDER
86	1	G0008966	BLOCK, POWER DIST-4 POLE (1)#4-500MCM
87	3	G0008942	POWER DIST. BLOCK COVER
88	2	G0008954	2 1/2" CORD FITTING
89	3	G0008563	TERMINAL BLOCK-4 COND ORANGE
90	7	G0008562	TERMINAL BLOCK-4 COND GREY
91	2	G0009324	TERMINAL BLOCK-4 COND YELLOW/GREEN
92	1	G0009477	FUSE BLOCK, 100A 600V 3P CLASS T
93	3	G0009476	FUSE, 90 AMP 600V CLASS T
94	2	G0009357	FUSE, 200 AMP 600V CLASS J
95	2	G0001651	FUSE, TIME DELAY-3-2/10 AMP CLASS CC
96	2	G0007227	MODULE, DIODE-DOUBLE-100 AMP
97	2	16894-01-002	JUMPER, BUS
98	3	G0009356	FUSE, 250 AMP 600V CLASS T
99	1	17306-01	STAND OFF, FUSE HOLDER
100	1	G0009354	FUSE BLOCK, 200 AMP 600V 3P CLASS T
101	3	G0009530	FUSE, 125 AMP 600V CLASS T
102	3	G0008792	FUSE, TIME DELAY-3.0 AMP CLASS CC
103	3	G0003493	FUSE, TIME DELAY-15 AMP CLASS CC
104	1	G0007951	ETHERNET CABLE X 8 1/2 (ETH SW-PLC)
105	1	G0007952	ETHERNET CABLE X 62 (ETH SW-PNL VIEW)
106	1	G0007953	ETHERNET CABLE X 84 (ETH SW-60HP)
107	1	G0007954	ETHERNET CABLE X 104 (ETH SW-150HP)
108	1	G0007955	ETHERNET CABLE X 178 (ETH SW-30HP)
109	35	G0007252	WIRE DUCT FASTENER MOUNT
110	28	PAN-TM3S10-C	WIRE SADDLE, SMALL
111	13	G0003519	WIRE SADDLE, MEDIUM
112	2	G0004970	HANDLE, LATCH
113	8	G0008893	COVER, DISTR BLOCK-FOR G0008891/8892
114	4	G0008890	COVER, DISTR BLOCK-FOR G0008966
115	1	G0009753	STOPPING PLUG M 63
116	1	G0007229	PLC POWER SUPPLY
117	1	G0007230	PLC END BARRIER
118	1	G0007995	COMPACT FLASH MEMORY CARD
119	4	G0009563	LUG, CRIMP-1 AWG #10 STUD
120	1	G0002301	AIR ELEMENT, DX (REPLACEMENT ONLY)
121	1	G0002302	AIR ELEMENT, BX (REPLACEMENT ONLY)
122	1	G0002873	COVER, CONTROL TRANSFORMER
123	1	G0002874	FUSE PULLER, CONTROL TRANSFORMER
124	1	NPLE-75 COND	COND NIPPLE
125	1	G0009972	SENSOR CABLE

ITEM	QTY	DRAWING NUMBER	DESCRIPTION
126	1	G0008349	PLC BATTERY (REPLACEMENT ONLY)
127	2	G0008449	ADAPTER/REDUCER 1"- M25
128	1	G0007258	REDUCER, 3" TO 2" NPT
129	1	TBS2535	3/4" CORD FITTING
130	1	CRH-EL296	CORD FITTING, 90 DEG
131	1	G0009974	SENSOR, RTD
132	1	17420-01	A/C THERMOSTAT MOUNTING BRACKET
133	1	G0009291	A/C EVAPORATOR FAN
134	2	G0008813	STOPPING PLUG M25
135	1	G0009197	ADAPTER/REDUCER 1.5"- M40
136	1	G0008807	STOPPING PLUG M40
137	3	G0008451	ADAPTER/REDUCER 2"-M50
138	3	G0008455	STOPPING PLUG M50
139	1	G0009467	ADAPTER/REDUCER 2.5" - M63
140	1	G0009466	STOPPING PLUG M63
141	1	G0009751	ADAPTER/REDUCER 3" -M50
142	1	G0009752	STOPPING PLUG M50
143	1	G0009568	ADAPTER/REDUCER 3"-M63

SPECIAL TOOL-PURGE PRESSURE MEASURING KIT-G0008378







REV	DESCRIPTION	BY	DATE
1	ITEM 15 WAS 15197-01-001 PER DRR# 2563; ADDED ITEMS 131, 132 & 133; ITEM 60 WAS G0008008; ITEM 58 & 61 QTY WAS 1; ITEM 59 QTY WAS 2	DJK	5/5/2011
2	ITEM 25 WAS G0007610;42 WAS G0008825;69 WAS G0004418 QTY 1; 71 WAS G0002967;QTY 90 WAS 1;101 WAS G0009353;115 WAS G0002966;124 WAS SHPP-100;125 WAS SHPP-150; 126 WAS SHPP-200; 127 WAS SHPP-250; 131 WAS G0009973; ADDED ITEMS 134-143	DMM	7/2/2012

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DRAWN	CCS	6/28/2010
CHECKED		
QA		
MFG		
APPROVED		

DERRICK® CORPORATION

TITLE

CONTROL ENCLOSURE ASSEMBLY
DE-7200 EX-PROOF 380/400/3

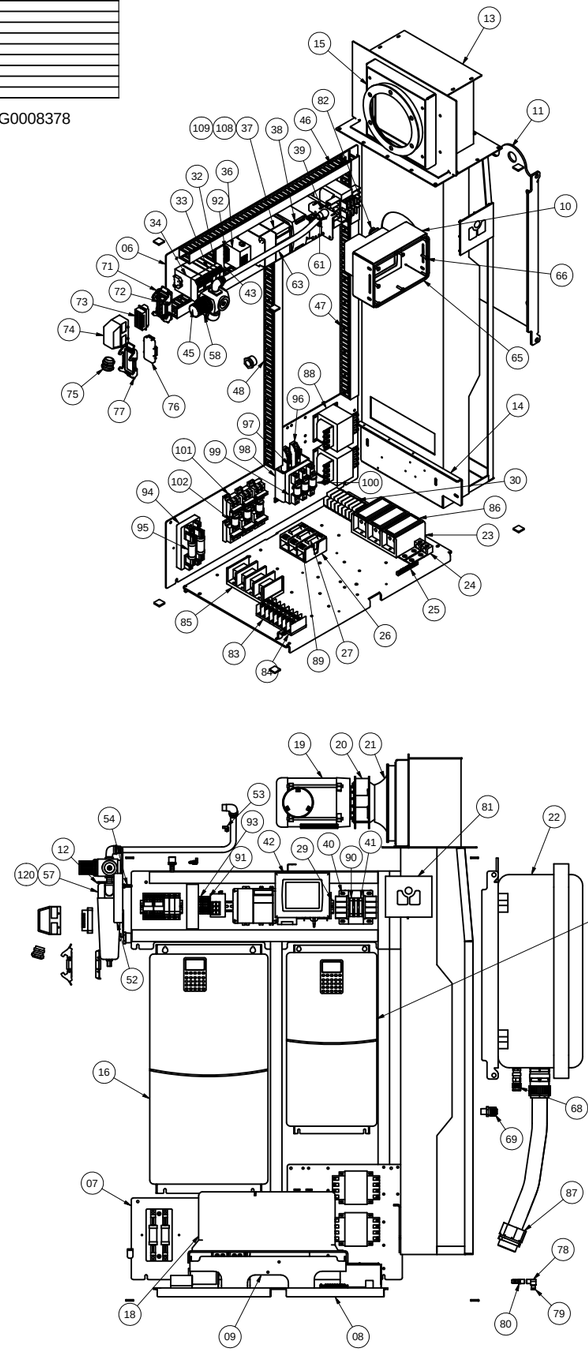
SIZE	FILECOPY	DWG NO	REV
D	N	16472-00-003	2

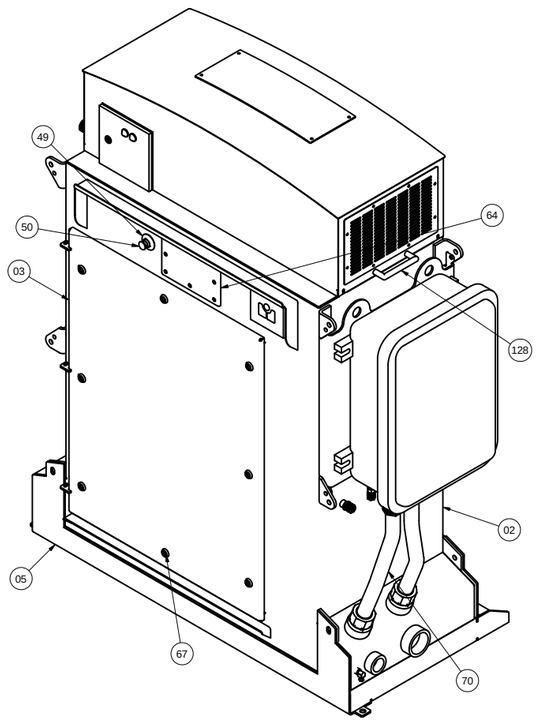
SCALE 1:10 | SHEET 1 OF 1

CENT, MAN

ITEM	QTY	PART NUMBER	DESCRIPTION
01	X	16472-01-004	ASSEMBLY COMPLETE
02	1	16396-01-003	ENCLOSURE ASSEMBLY
03	1	16400-01-003	DOOR ASSEMBLY
04	1	16401-01-002	COVER ASSEMBLY
05	1	16402-01-001	STAND ASSEMBLY
06	1	16404-01-004	COMPONENT PANEL (UPPER)
07	1	16404-02-004	COMPONENT PANEL (LOWER)
08	1	16404-03-004	COMPONENT PANEL (BOTTOM)
09	1	16404-01-003	COMPONENT MOUNT ASSEMBLY
10	1	16405-01	DISPLAY SCREEN MOUNT
11	1	16597-01	ENCLOSURE MOUNTING BRACKET
12	1	16598-01	AIR FILTER MOUNTING BRACKET
13	1	G0002891	AIR CONDITIONER, 12,000 BTU/HR 460/60/3
14	1	16403-01	A/C SUPPORT ANGLE
15	1	15197-01-003	INLET CONE EXTENSION
16	1	G0009350	DRIVE, 150 HP 600VAC 60 HZ
17	1	G0009351	DRIVE, 60 HP 600VAC 60 HZ
18	1	G0009352	DRIVE, 30 HP 600VAC 60 HZ
19	1	G0007588	AIR CONDITIONER COOLING MOTOR
20	1	G0002603	FANWHEEL, 8" BACKWARD CURVED
21	1	G0002604	INLET CONE
22	1	16607-03	EX-PROOF ENCLOSURE
23	1	G0008941	POWER DIST. BLOCK, INCOMING
24	2	G0007213	GROUND LUG, INCOMING
25	1	G0007610	GROUND BUS BAR, INCOMING
26	1	G0007221	FUSE BLOCK, 60 AMP CLASS J
27	3	G0007223	FUSE COVER, INDICATOR
28	1	G0007998	DIN RAIL, 35MM X 5 1/2
29	3	G0007012	TERMINAL BLOCK END BARRIER
30	3	G0007214	FUSE BLOCK, 30 AMP 3P CLASS CC
31	1	G0007645	DIN RAIL, 35MM X 5
32	1	G0009286	BARRIER, INTRINSIC SAFE-VIBR SWITCH+E-STOP
33	2	G0007918	BARRIER, INTRINSIC SAFE-RTD SENSOR
34	2	17244-02	BARRIER, INTRINSIC SAFE-SPEED SENSOR
35	1	G0007999	DIN RAIL, 35MM X 16
36	1	G0007231	ETHERNET SWITCH, 6 PORT
37	1	G0007228	PLC, COMPACTLOGIX PROCESSOR
38	1	G0003552	POWER SUPPLY, 24VDC, 5 AMP
39	1	G0003504	SURGE SUPPRESSOR, 120V 60HZ
40	1	G0004986	TRANSFORMER, 500VA, 600PRI/120V SEC
41	1	G0002911	FUSE, TIME DELAY 7.0A 250 VAC
42	1	G0008825	OPERATOR INTERFACE - 120 VAC
43	1	G0008000	WIRE DUCT, 1 1/2 X 2 X 6
44	1	G0008001	WIRE DUCT, 1 1/2 X 2 X 10 1/2
45	1	G0008002	WIRE DUCT, 1 1/2 X 2 X 33 1/8
46	1	G0007338	WIRE DUCT, 1 1/2 X 2 X 30 3/4
47	1	G0007650	WIRE DUCT, 1 1/2 X 2 X 28 7/8
48	1	G0008010	WIRE DUCT, 1 1/2 X 2 X 34 3/8
49	1	G0007244	NAMEPLATE, EMERGENCY STOP
50	1	G0005325	BUTTON, EMERGENCY STOP
51	1	G0007865	PURGE UNIT W/RELIEF VALVE
52	1	G0008006	RELIEF VALVE (SERIAL # OF PURGE UNIT REQUIRED)
53	2	IMP-116B-02X02	1/8 90 DEG STREET ELBOW, BRASS
54	2	G0004679	1/8 X 3/16 HOSE BARB
55	1	G0003565	AIR FILTER, DX
56	1	NPLE-50X200S-4	1/2 X 2 PIPE NIPPLE, SST
57	1	G0002300	AIR FILTER, BX
58	2	G0002716	1/2 X 1 1/2 PIPE NIPPLE, SST
59	1	G0002714	1/2 90 DEG ELBOW, SST
60	1	G0009927	AIR REGULATOR
61	2	G0008003	1/2 90 DEG STREET ELBOW, BRASS
62	3	G0008004	1/2 X 1/2 HOSE BARB
63	1	G0008009	AIR HOSE
64	1	15181-01-001	DISPLAY SCREEN PROTECTIVE COVER
65	1	G0004364	O-RING, PROTECTIVE COVER
66	8	G0008007	1/4-20 SEALING PAN HEAD SCREW
67	8	G0008005	DOOR LATCH
68	1	G0004444	1/2" CABLE GLAND
69	1	G0004419	1/2" CABLE FITTING
70	2	16627-01-001	CABLE ASSEMBLY
71	1	G0007846	CONNECTOR HOUSING
72	1	G0007848	INSERT TERMINAL, FEMALE
73	1	G0007852	INSERT TERMINAL, MALE
74	1	G0007850	CONNECTOR HOOD
75	1	G0009238	CABLE GLAND, HOOD (7-17MM)
76	1	G0007851	CONNECTOR COVER, HOUSING
77	1	G0007849	CONNECTOR COVER, HOOD
78	1	IMP-116B-04X04	1/4 X 90 DEG STREET ELBOW, BRASS
79	1	CRH-ECD-284	1/4 DRAIN PLUG
80	1	G0008267	1/2 X 1/4 NPT HOSE BARB
81	1	17006-01	INDUSTRIAL MOUSE W/CABLE
82	1	17006-02	CABLE ASSEMBLY
83	2	G0008891	BLOCK, PWR DISTR-3 POLE 2/0 #14
84	2	G0008892	BLOCK, PWR DISTR-1 POLE 2/0 #14 W/ADDER
85	1	G0008966	BLOCK, PWR DISTR-4 POLE (1)#4-500MCM
86	3	G0008942	POWER DIST. BLOCK COVER
87	2	G0008964	2 1/2" CORD FITTING
88	2	G0008857	TRANSFORMER, 350VA 480V PRI/120 SEC
89	3	G0007222	FUSE, 50 AMP CLASS J
90	2	G0009183	FUSE, TIME DELAY2.0A 600 VAC
91	6	G0008563	TERMINAL BLOCK-4 COND, ORANGE
92	3	G0008572	TERMINAL BLOCK GROUND-BLUE 4PT
93	2	G0009324	TERMINAL BLOCK GROUND-YELLOW/GREEN 4PT
94	1	G0009481	FUSE HOLDER, 100A 600V 2P CLASS J
95	2	G0009480	FUSE, 100A/600V CLASS J
96	2	G0007227	MODULE, DIODE-DOUBLE 100 AMP
97	2	16894-01-002	JUMPER, BUS
98	1	17306-01	STAND OFF, FUSE HOLDER
99	1	G0009477	FUSE HOLDER, 100A 600V 3P CLASS T
100	3	G0009476	FUSE, 90 AMP 600V CLASS T
101	6	G0007631	FUSE HOLDER 400 AMP 1P CLASS T
102	3	G0009353	FUSE, 175 AMP CLASS T
103	3	G0007589	FUSE, TIME DELAY 3.0 AMP CLASS CC
104	8	G0008893	COVER, DIST. BLOCK-FOR G0008891/8892
105	4	G0008890	COVER DIST. BLOCK-FOR G0008966
106	3	G0008792	FUSE, TIME DELAY 3.0 AMP CLASS CC
107	3	G0009451	FUSE, TIME DELAY 5.0 AMP CLASS CC
108	1	G0007229	PLC POWER SUPPLY
109	1	G0007230	PLC END BARRIER
110	1	G0008349	PLC BATTERY REPLACEMENT
111	1	G0007995	COMPACT FLASH MEMORY CARD
112	1	G0002873	COVER, CONTROL TRANSFORMER
113	1	G0002874	FUSE PULLER, CONTROL TRANSFORMER
114	1	G0007951	ETHERNET CABLE X 8 1/2 (ETH SW-PLC)
115	1	G0008122	ETHERNET CABLE X 62 (ETH SW-PNL VIEW)
116	1	G0007952	ETHERNET CABLE X 84 (ETH SW-60 HP)
117	1	G0008123	ETHERNET CABLE X 104 (ETH SW-150 HP)
118	1	G0008121	ETHERNET CABLE X 178 (ETH SW-30 HP)
119	1	G0002301	AIR ELEMENT, DX (REPLACEMENT ONLY)
120	1	G0002302	AIR ELEMENT, BX (REPLACEMENT ONLY)
121	2	G0007701	LUG, CRIMP #6 AWG
122	6	G0007633	LUG, CRIMP #1 AWG
123	2	G0007256	LUG, CRIMP #2 AWG
124	1	G0002966	CABLE GLAND
125	1	ITBS2535	3/4" CORD FITTING
126	1	CRH-EL296	CORD FITTING, 90 DEG ELBOW
127	1	G0002967	CABLE, GEXOL 16 AWG-16C (6 FT)
128	2	G0004970	HANDLE, COVER
129	35	G0007252	WIRE DUCT FASTENER MOUNT
130	28	PAN-TM3S10-C	WIRE SADDLE, SMALL
131	13	G0003519	WIRE SADDLE, MEDIUM
132	2	SHPP-100	1" NPT PLUG
133	1	SHPP-150	1 1/2" NPT PLUG
134	3	SHPP-200	2" NPT PLUG
135	1	SHPP-250	2 1/2" NPT PLUG
136	1	G0007258	REDUCER, 3" TO 2" NPT
137	1	17420-01	A/C THERMOSTAT MOUNTING BRACKET
138	1	G0009973	SENSOR, RTD
139	1	G0009291	A/C EVAPORATOR FAN

SPECIAL TOOL-PURGE PRESSURE MEASURING KIT-G0008378





REV	DESCRIPTION	BY	DATE
1	ITEM 15 WAS 15197-01-001 PER DRR# 2563; ADDED ITEMS 137, 138 AND 139; ITEM 60 WAS G0008008; ITEM 58 & 61, QTY WAS 1; ITEM 59 QTY WAS 2	DJK	5/5/2011

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DRAWN	CCS	4/7/2010
CHECKED		
QA		
MFG		
APPROVED		

DERRICK® CORPORATION

TITLE

CONTROL ENCLOSURE ASSEMBLY
DE-7200 EX-PROOF 575/600/60/3

SIZE	FILECOPY	DWG NO	REV
D	N	16472-00-004	1

SCALE 1:10 SHEET 1 OF 1

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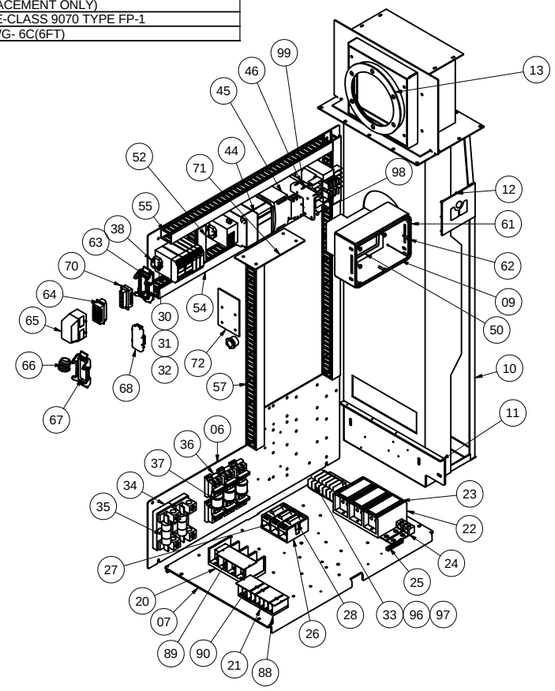
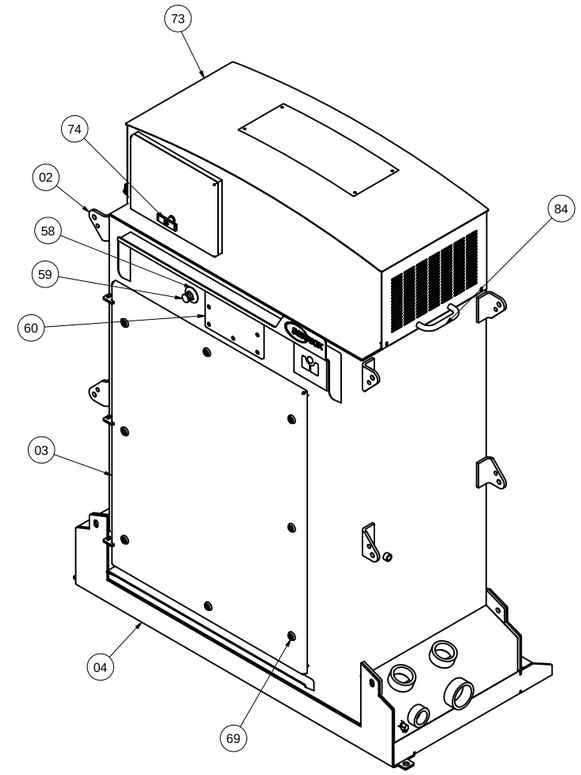
Parts List

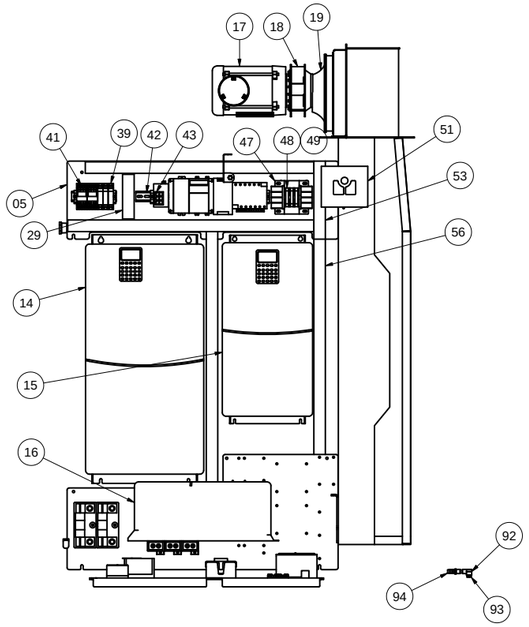
ITEM	QTY	DRAWING NUMBER	DESCRIPTION
01	X	16472-01-005	ASSEMBLY COMPLETE
02	1	16396-01-003	ENCLOSURE ASSEMBLY
03	1	16400-01-003	DOOR ASSEMBLY
04	1	16402-01-001	STAND ASSEMBLY
05	1	16404-01-004	COMPONENT PANEL (UPPER)
06	1	16404-02-004	COMPONENT PANEL (LOWER)
07	1	16404-03-004	COMPONENT PANEL (BOTTOM)
08	1	16404-01-003	COMPONENT MOUNT ASSEMBLY
09	1	16405-01	DISPLAY SCREEN MOUNT
10	1	G0002881	AIR CONDITIONER, 12,000 BTU/HR 460/60/3
11	1	16403-01	A/C SUPPORT ANGLE
12	1	16609-01	CONTROL MOUSE COVER
13	1	15197-01-003	INLET CONE EXTENSION
14	1	G0007573	DRIVE, 150 HP 460VAC 60 HZ
15	1	G0007690	DRIVE, 60 HP 460VAC 60 HZ
16	1	G0007689	DRIVE, 30 HP 460VAC 60 HZ
17	1	G0007588	AIR CONDITIONER COOLING MOTOR
18	1	G0002603	FAN WHEEL, 8" BACKWARD CURVED
19	1	G0002604	INLET CONE
20	1	G0008966	PWR DISTR, BLOCK-4 POLE (1)#4-500MCM
21	2	G0008891	POWER DIST. BLOCK, OUTGOING-2/0 AWG-3 POLE
22	1	G0008941	POWER DIST. BLOCK, INCOMING (2) 500 MCM -3 POLE
23	3	G0008942	POWER DIST. BLOCK COVER 1 POLE
24	2	G0007213	GROUND LUG, INCOMING
25	1	G0005309	GROUND BUS BAR, INCOMING
26	1	G0007221	FUSE BLOCK, 60 AMP 3P CLASS J
27	3	G0007698	FUSE, 60 AMP CLASS J
28	3	G0007223	FUSE COVER, INDICATING
29	1	G0007998	DIN RAIL, 35MM X 5 1/2
30	6	G0008507	TERMINAL BLOCK END BARRIER
31	2	G0009324	TERMINAL BLOCK GROUND-YELLOW/GREEN 4 PT
32	2	G0008563	TERMINAL BLOCK BARRIER-ORANGE 4 PT
33	2	G0007214	FUSE BLOCK, 30 AMP 3P CLASS CC
34	2	G0007224	FUSE BLOCK, 200 AMP 1P CLASS J
35	2	G0007225	FUSE, 150 AMP CLASS J TYPE HSJ
36	6	G0007631	FUSE BLOCK, 400 AMP 3P CLASS T
37	3	G0007632	FUSE, 225 AMP CLASS T
38	1	G0007984	DIN RAIL, 35MM X 5
39	1	G0009286	BARRIER, INTRINSIC SAFE-VIBR SWITCH
40	2	G0007918	BARRIER, INTRINSIC SAFE-RTD SENSOR
41	2	17244-02	BARRIER, INTRINSIC SAFE-SPEED SENSOR - PROGRAMMED
42	1	G0007999	DIN RAIL, 35MM X 16
43	1	G0007231	ETHERNET SWITCH, 6 PORT
44	1	G0007228	PLC, COMPACTLOGIX PROCESSOR
45	1	G0003552	POWER SUPPLY, 24VDC, 5 AMP
46	1	G0003504	SURGE SUPPRESSOR, 120V 60HZ
47	1	G0003494	TRANSFORMER, 500VA, 460V PRI/120V SEC
48	2	G0002910	FUSE, TIME DELAY 2.5A 600VAC
49	1	G0002911	FUSE, TIME DELAY 7.0A 250VAC
50	1	G0007976	OPERATOR INTERFACE- PROGRAMMED
51	1	17006-01	INDUSTRIAL MOUSE/POINTER ASSY
52	1	G0008000	WIRE DUCT, 1/2 X 2 X 6
53	1	G0008001	WIRE DUCT, 1/2 X 2 X 10 1/2
54	1	G0008002	WIRE DUCT, 1/2 X 2 X 33 1/8
55	1	G0007338	WIRE DUCT, 1/2 X 2 X 30 3/4
56	1	G0007650	WIRE DUCT, 1/2 X 2 X 28 7/8
57	1	G0008010	WIRE DUCT, 1/2 X 2 X 34 3/8
58	1	G0007244	NAMEPLATE, EMERGENCY STOP
59	1	G0005325	BUTTON, EMERGENCY STOP
60	1	15181-01-001	DISPLAY SCREEN PROTECTIVE COVER
61	1	G0004364	O-RING, PROTECTIVE COVER
62	8	G0008007	1/4-20 SEALING PAN HEAD SCREW
63	1	G0007846	CONNECTOR HOUSING
64	1	G0007852	INSERT TERMINAL, MALE
65	1	G0007850	CONNECTOR HOOD
66	1	G0009238	CABLE GLAND
67	1	G0007849	CONNECTOR COVER, HOOD
68	1	G0007851	CONNECTOR COVER, HOUSING
69	8	G0008005	DOOR LATCH
70	1	G0007848	INSERT TERMINAL, FEMALE
71	1	16623-01	CLOSE OFF PLATE, 10GA X 4 X 9 1/2
72	1	16623-02	CLOSE OFF PLATE, 10GA X 4 X 6
73	1	16401-01	CONDENSER COVER ASSEMBLY
74	1	G0007246	TEE HANDLE
75	35	G0007252	WIRE DUCT FASTENER MOUNT
76	28	PAN-TM3S10-C	WIRE SADDLE, SMALL
77	13	G0003519	WIRE SADDLE, MEDIUM
78	1	17006-02	CABLE ASSEMBLY (USB TO PS2 TO IDC)
79	1	G0007951	ETHERNET CABLE X 8 1/2 (ETH SW-PLC)
80	1	G0007952	ETHERNET CABLE X 62 (ETH SW-PNL VIEW)
81	1	G0007953	ETHERNET CABLE X 84 (ETH SW-60HP)
82	1	G0007954	ETHERNET CABLE X 104 (ETH SW-150HP)
83	1	G0007955	ETHERNET CABLE X 178 (ETH SW-30HP)
84	2	G0004970	HANDLE, COVER
85	2	G0007701	LUG, CRIMP #6 AWG
86	6	G0007633	LUG, CRIMP #1 AWG
87	2	G0007256	LUG, CRIMP #2 AWG
88	1	G0008892	POWER DIST BLACK- 2/0 AWG- 1P
89	4	G0008890	FINGER SAFE COVER FOR G0008896
90	8	G0008893	FINGER SAFE COVER FOR G0008891 & G0008892
91	1	G0002873	COVER,XFRMR-CLASS 9070 TYPE FSC-2
92	1	IMP-116B-04X04	1/4 90 DEG STREET ELBOW, BRASS
93	1	16701-01	1/4 NPT DRAIN PLUG
94	1	G0008267	1/2 X 1/4 NPT HOSE BARB
95	1	G0007995	COMPACT FLASH MEMORY CARD
96	3	G0008792	FUSE, TIME DELAY-3 AMP CLASS CC
97	3	G0003493	FUSE, TIME DELAY-15 AMP CLASS CC
98	1	G0009974	SENSOR, RTD
99	1	17420-01	A/C THERMOSTAT MOUNTING BRACKET

Parts List

ITEM	QTY	DRAWING NUMBER	DESCRIPTION
100	1	G0009291	A/C EVAPORATOR FAN (REPLACEMENT ONLY0
101	2	G0002535	CORD FITTING 3/4"
102	1	CRH-EL296	ELBOW 90 DEG 3/4" M-F
103	1	G0009972	SENSOR CABLE
104	1	G0007229	PLC POWER SUPPLY
105	1	G0007230	PLC END CAP
106	1	G0008349	PLC BATTERY (REPLACEMENT ONLY)
107	1	G0002874	COVER/PULLER,FUSE-CLASS 9070 TYPE FP-1
108	1	G0002967	CABLE,GEXOL, 16 AWG- 6C(6FT)







REV	DESCRIPTION	BY	CKD	DATE
1	ITEM 20 WAS G0007217; ITEM 21 WAS G0007218; ADDED ITEMS 88-94.	CCS		8/14/2007
2	ITEM 01 WAS 16400-01-001; QUANTITY OF ITEM 69 WAS 5.	CCS		9/5/2007
3	ADDED ITEMS 95 THRU 97; UPDATED VIEWS.	CCS		5/13/2008
4	ITEM 50 WAS G0007245.	CCS		8/24/2010
5	ITEM 13 WAS 15197-01-001 PER DRR# 2563; ADDED ITEMS 98, 99 & 100	DJK		5/5/2011
6	ITEM 20 WAS G0008261;21 WAS G0008262;22 WAS G0007210; 23 WAS G0007211;25 WAS G0007610;30 WAS G0007012; 31 WAS G0007216; 32 G0007237 QTY 1; 39 WAS G0007232 QTY 2; 40 WAS G0007233; 41 WAS G0007234 QTY 1; 50 WAS G0008825; 51 WAS G0003466;66 WAS G0007847; 78 WAS 16449-01; 88 WAS G0008263; 89 WAS G0008264 QTY 1; 90 WAS G0008265 QTY 2; 91 WAS G0008266; 96 WAS G0007981; 98 WAS G0009973; ADDED ITEMS 101-108	DMM	JWC	7/3/12

GEOMETRIC CHARACTERISTIC SYMBOLS

FLATNESS, STRAIGHTNESS, ROUNDNESS, CYLINDRICITY, PARALLELISM, PERPENDICULARITY, ANGULARITY, RUNOUT, POSITION, CONCENTRICITY, SYMMETRY

TOLERANCES UNLESS SPECIFIED

	DEC	MM
(2) PLACE DEC.	+/- .0100	+/- .254
(3) PLACE DEC.	+/- .0050	+/- .127
(4) PLACE DEC.	+/- .0002	+/- .005
ANGLES	+/- .1°	+/- .1°

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DRAWN	fjmonroe	5/15/2007
CHECKED	CCSMITH	5/17/2007
QA		
MFG		
APPROVED		

DERRICK® CORPORATION

TITLE

CONTROL ENCLOSURE ASSEMBLY
DE-7200 460/480/60/3

SIZE	FILECOPY	DWG NO	REV
D	Y	16472-00-005	6

SCALE 1:10 SHEET 1 OF 1

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SEÇÃO 9 - REGISTOS DE INSTALAÇÃO E MANUTENÇÃO

OBJETIVO

Esta seção deve ser utilizada pelo pessoal de operação e manutenção para registrar informações históricas recolhidas durante a instalação e operação do equipamento Derrick. Se for devidamente mantido, o registro será útil para alterar os intervalos de manutenção e interceptar as tendências que podem indicar a necessidade de alterar procedimentos operacionais. Cada entrada no registro deve ser datada para futuras referências e monitoramento. Se necessário, páginas adicionais podem ser acrescentadas ao registo copiando-se uma página em branco ou simplesmente inserindo-se papel pautado na parte traseira da seção.

Notas de Instalação e Manutenção:

SEÇÃO 10 - DADOS DO FORNECEDOR

GERAL

Esta seção contém manuais, boletins, instruções e outros dados técnicos dos fabricantes para componentes instalados na centrífuga. Consulte a Seção 8 para os desenhos do conjunto Derrick, listas de peças e diagrama esquemático elétrico.

COMPONENTE	DESCRIÇÃO	DOCUMENTO
Acionador da Frequência Variável Allen-Bradley PowerFlex 700	Manual de Usuário Seção 4 e Seção 1 páginas 1-13 & 1-14	*20B-UM002B-EN-P*
Motor de Acionamento do Recipiente & do transportador Marathon	Instruções de Instalação, Operações & Manutenção.	*5554E*
Controle de Temperatura do Ar Condicionado Johnson	Instruções de Instalação & Operação	*997-349-7*
Ar Condicionado DTS	Solução de problemas	*10,99*
	Diagramas de Dados Técnicos e de Circuito	*Sem Número*
Demonstração do Gabinete de Tecnologias do Sistema de Drenagem	Instruções de Instalação, Operações & Manutenção.	*ML384*
	Manual do MiniDreno Tamanho 1	*ML306*
Absorvedor de Choque/Interruptor de Vibração Modelo VS2EX	Instruções de instalação	*VS-7037N*

Troubleshooting

Chapter 4 provides information to guide you in troubleshooting the PowerFlex 700. Included is a listing and description of drive faults (with possible solutions, when applicable) and alarms.

For information on...	See page...
Faults and Alarms	4-1
Drive Status	4-2
Manually Clearing Faults	4-4
Fault Descriptions	4-4
Clearing Alarms	4-9
Alarm Descriptions	4-10
Common Symptoms and Corrective Actions	4-13
Testpoint Codes and Functions	4-16

Faults and Alarms

A fault is a condition that stops the drive. There are three fault types.

Type	Fault Description	
①	Auto-Reset Run	When this type of fault occurs, and [Auto Rstrt Tries] (see page 3-30) is set to a value greater than "0," a user-configurable timer, [Auto Rstrt Delay] (see page 3-30) begins. When the timer reaches zero, the drive attempts to automatically reset the fault. If the condition that caused the fault is no longer present, the fault will be reset and the drive will be restarted.
②	Non-Resettable	This type of fault normally requires drive or motor repair. The cause of the fault must be corrected before the fault can be cleared. The fault will be reset on power up after repair.
③	User Configurable	These faults can be enabled/disabled to annunciate or ignore a fault condition.

An alarm is a condition that, if left untreated, may stop the drive. There are two alarm types.

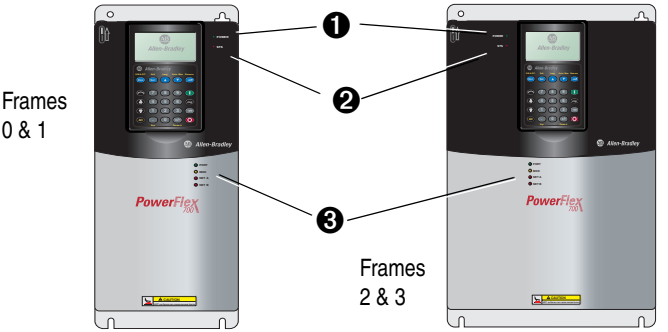
Type	Alarm Description	
①	User Configurable	These alarms can be enabled or disabled through [Alarm Config 1] on page 3-44.
②	Non-Configurable	These alarms are always enabled.

Drive Status

The condition or state of your drive is constantly monitored. Any changes will be indicated through the LEDs and/or the HIM (if present).

Front Panel LED Indications

Figure 4.1 Typical Drive Status Indicators



#	Name	Color	State	Description
1	PWR (Power)	Green	Steady	Illuminates when power is applied to the drive.
2	STS (Status)	Green	Flashing	Drive ready, but not running & no faults are present.
			Steady	Drive running, no faults are present.
		Yellow See page 4-10	Flashing, Drive Stopped	A start inhibit condition exists, the drive cannot be started. Check parameter 214 [Start Inhibits].
			Flashing, Drive Running	An intermittent type 1 alarm condition is occurring. Check parameter 211 [Drive Alarm 1].
			Steady, Drive Running	A continuous type 1 alarm condition exists. Check parameter 211 [Drive Alarm 1].
		Red See page 4-4	Flashing	Fault has occurred. Check [Fault x Code] or Fault Queue.
			Steady	A non-resettable fault has occurred.
3	PORT	Green	–	Status of DPI port internal communications (if present).
	MOD	Yellow	–	Status of communications module (when installed).
	NET A	Red	–	Status of network (if connected).
	NET B	Red	–	Status of secondary network (if connected).

Precharge Board LED Indications

Precharge Board LED indicators are found on Frame 5 & 6 drives. The LEDs are located above the "Line Type" jumper shown in Figure 1.2.

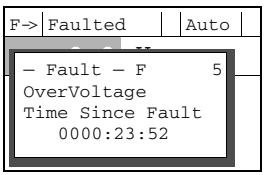
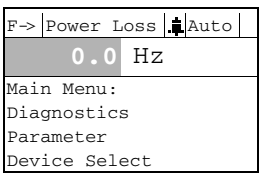
Name	Color	State	Description
Power	Green	Steady	Indicates when precharge board power supply is operational
Alarm	Yellow	Flashing	Number in "[ ]" indicates flashes and associated alarm(1):
		[1]	Low line voltage (<90%).
		[2]	Very low line voltage (<50%).
		[3]	Low phase (one phase <80% of line voltage).
		[4]	Frequency out of range or asymmetry (line sync failed).
		[5]	Low DC bus voltage (triggers ride-through operation).
		[6]	Input frequency momentarily out of range (40-65 Hz).
		[7]	DC bus short circuit detection active.
Fault	Red	Flashing	Number in "[ ]" indicates flashes and associated fault(2):
		[2]	DC bus short (Udc <2% after 20 ms).
		[4]	Line sync failed or low line (Uac <50% Unom).

(1) An alarm condition automatically resets when the condition no longer exists

(2) A fault indicates a malfunction that must be corrected and can only be reset after cycling power.

HIM Indication

The LCD HIM also provides visual notification of a fault or alarm condition.

Condition	Display
Drive is indicating a fault. The LCD HIM immediately reports the fault condition by displaying the following. • "Faulted" appears in the status line • Fault number • Fault name • Time that has passed since fault occurred Press Esc to regain HIM control.	
Drive is indicating an alarm. The LCD HIM immediately reports the alarm condition by displaying the following. • Alarm name (Type 2 alarms only) • Alarm bell graphic	

Manually Clearing Faults

Step	Key(s)
1. Press Esc to acknowledge the fault. The fault information will be removed so that you can use the HIM.	Esc
2. Address the condition that caused the fault. The cause must be corrected before the fault can be cleared.	
3. After corrective action has been taken, clear the fault by **one** of these methods. • Press Stop • Cycle drive power • Set parameter 240 [Fault Clear] to "1." • "Clear Faults" on the HIM Diagnostic menu.	

Fault Descriptions

Table 4.A Fault Types, Descriptions and Actions

Fault	No.	Type(1)	Description	Action
Analog In Loss	29	① ③	An analog input is configured to fault on signal loss. A signal loss has occurred. Configure with [Anlg In 1, 2 Loss] on page 3-52.	1. Check parameters. 2. Check for broken/loose connections at inputs.
Anlg Cal Chksum	108		The checksum read from the analog calibration data does not match the checksum calculated.	Replace drive.
Auto Rstrt Tries	33	③	Drive unsuccessfully attempted to reset a fault and resume running for the programmed number of [Flt RstRun Tries]. Enable/Disable with [Fault Config 1] on page 3-42.	Correct the cause of the fault and manually clear.
AutoTune Aborted	80		Autotune function was canceled by the user or a fault occurred.	Restart procedure.
Auxiliary Input	2	①	Auxiliary input interlock is open.	Check remote wiring.
Cntl Bd Overtemp	55		The temperature sensor on the Main Control Board detected excessive heat.	1. Check Main Control Board fan. 2. Check surrounding air temperature. 3. Verify proper mounting/cooling.
DB Resistance	69		Resistance of the internal DB resistor is out of range.	Replace resistor.

Fault	No.	Type(1)	Description	Action
Decel Inhibit	24	③	The drive is not following a commanded deceleration because it is attempting to limit bus voltage.	1. Verify input voltage is within drive specified limits. 2. Verify system ground impedance follows proper grounding techniques. 3. Disable bus regulation and/or add dynamic brake resistor and/or extend deceleration time. **Refer to the Attention statement on page P-4 for further info.**
Drive OverLoad	64		Drive rating of 110% for 1 minute or 150% for 3 seconds has been exceeded.	Reduce load or extend Accel Time.
Drive Powerup	49		No fault displayed. Used as a Power Up Marker in the Fault Queue indicating that the drive power has been cycled.	
Excessive Load	79		Motor did not come up to speed in the allotted time during autotune.	1. Uncouple load from motor. 2. Repeat Autotune.
Encoder Loss	91		Requires differential encoder. One of the 2 encoder channel signals is missing.	1. Check Wiring. 2. Replace encoder.
Encoder Quad Err	90		Both encoder channels changed state within one clock cycle.	1. Check for externally induced noise. 2. Replace encoder.
Faults Cleared	52		No fault displayed. Used as a marker in the Fault Queue indicating that the fault clear function was performed.	
Flt QueueCleared	51		No fault displayed. Used as a marker in the Fault Queue indicating that the clear queue function was performed.	
FluxAmpsRef Rang	78		The value for flux amps determined by the Autotune procedure exceeds the programmed [Motor NP FLA].	1. Reprogram [Motor NP FLA] with the correct motor nameplate value. 2. Repeat Autotune.
Ground Fault	13	①	A current path to earth ground greater than 25% of drive rating.	Check the motor and external wiring to the drive output terminals for a grounded condition.
Hardware Fault	93		Hardware enable is disabled (jumpered high) but logic pin is still low.	1. Check jumper. 2. Replace Main Control Board.
Hardware Fault	130		Gate array load error.	1. Cycle power. 2. Replace Main Control Board.
Hardware Fault	131		Dual port failure.	1. Cycle power. 2. Replace Main Control Board.
Hardware PTC	18		Motor PTC (Positive Temperature Coefficient) Overtemp.	
Heatsink OvrTemp	8	①	Heatsink temperature exceeds 100% of [Drive Temp].	1. Verify that maximum ambient temperature has not been exceeded. 2. Check fan. 3. Check for excess load.

Fault	No.	Type(1)	Description	Action
HW OverCurrent	12	①	The drive output current has exceeded the hardware current limit.	Check programming. Check for excess load, improper DC boost setting, DC brake volts set too high or other causes of excess current.
Incompat MCB-PB	106	②	Drive rating information stored on the power board is incompatible with the main control board.	Load compatible version files into drive.
I/O Comm Loss	121		I/O Board lost communications with the Main Control Board.	Check connector. Check for induced noise. Replace I/O board or Main Control Board.
I/O Failure	122		I/O was detected, but failed the powerup sequence.	Replace Main Control Board.
Input Phase Loss	17		The DC bus ripple has exceeded a preset level.	Check incoming power for a missing phase/blown fuse.
IR Volts Range	77		"Calculate" is the autotune default and the value determined by the autotune procedure for IR Drop Volts is not in the range of acceptable values.	Re-enter motor nameplate data.
IXo VoltageRange	87		Voltage calculated for motor inductive impedance exceeds 25% of [Motor NP Volts].	1. Check for proper motor sizing. 2. Check for correct programming of [Motor NP Volts], parameter 41. 3. Additional output impedance may be required.
Load Loss	15		Drive output torque current is below [Load Loss Level] for a time period greater than [Load Loss time].	1. Verify connections between motor and load. 2. Verify level and time requirements.
Motor Overload	7	① ③	Internal electronic overload trip. Enable/Disable with [Fault Config 1] on page 3-42.	An excessive motor load exists. Reduce load so drive output current does not exceed the current set by [Motor NP FLA].
Motor Thermistor	16		Thermistor output is out of range.	1. Verify that thermistor is connected. 2. Motor is overheated. Reduce load.
NVS I/O Checksum	109		EEprom checksum error.	1. Cycle power and repeat function. 2. Replace Main Control Board.
NVS I/O Failure	110		EEprom I/O error.	1. Cycle power and repeat function. 2. Replace Main Control Board.
Output PhaseLoss	21		Current in one or more phases has been lost or remains below a preset level.	Check the drive and motor wiring. Check for phase-to-phase continuity at the motor terminals. Check for disconnected motor leads.

Fault	No.	Type(1)	Description	Action
OverSpeed Limit	25	①	Functions such as Slip Compensation or Bus Regulation have attempted to add an output frequency adjustment greater than that programmed in [Overspeed Limit].	Remove excessive load or overhauling conditions or increase [Overspeed Limit].
OverVoltage	5	①	DC bus voltage exceeded maximum value.	Monitor the AC line for high line voltage or transient conditions. Bus overvoltage can also be caused by motor regeneration. Extend the decel time or install dynamic brake option.
Parameter Chksum	100	②	The checksum read from the board does not match the checksum calculated.	1. Restore defaults. 2. Reload User Set if used.
Params Defaulted	48		The drive was commanded to write default values to EEPROM.	1. Clear the fault or cycle power to the drive. 2. Program the drive parameters as needed.
Phase U to Grnd	38		A phase to ground fault has been detected between the drive and motor in this phase.	1. Check the wiring between the drive and motor. 2. Check motor for grounded phase. 3. Replace drive.
Phase V to Grnd	39			
Phase W to Grnd	40			
Phase UV Short	41		Excessive current has been detected between these two output terminals.	1. Check the motor and drive output terminal wiring for a shorted condition. 2. Replace drive.
Phase VW Short	42			
Phase UW Short	43			
Port 1-5 DPI Loss	81-85	②	DPI port stopped communicating. A SCANport device was connected to a drive operating DPI devices at 500k baud.	1. If adapter was not intentionally disconnected, check wiring to the port. Replace wiring, port expander, adapters, Main Control Board or complete drive as required. 2. Check HIM connection. 3. If an adapter was intentionally disconnected and the [Logic Mask] bit for that adapter is set to "1", this fault will occur. To disable this fault, set the [Logic Mask] bit for the adapter to "0."
Port 1-5 Adapter	71-75		The communications card has a fault.	1. Check DPI device event queue and corresponding fault information for the device.
Power Loss	3	① ③	DC bus voltage remained below 85% of nominal for longer than [Power Loss Time]. Enable/ Disable with [Fault Config 1] on page 3-42.	Monitor the incoming AC line for low voltage or line power interruption.

Fault	No.	Type(1)	Description	Action
Power Unit	70		One or more of the output transistors were operating in the active region instead of desaturation. This can be caused by excessive transistor current or insufficient base drive voltage.	1. Check for damaged output transistors. 2. Replace drive.
Pulse In Loss	92		Z Channel is selected as a pulse input and no signal is present.	1. Check wiring. 2. Replace pulse generator.
Pwr Brd Chksum1	104		The checksum read from the EEPROM does not match the checksum calculated from the EEPROM data.	Clear the fault or cycle power to the drive.
Pwr Brd Chksum2	105	②	The checksum read from the board does not match the checksum calculated.	1. Cycle power to the drive. 2. If problem persists, replace drive.
Replaced MCB-PB	107	②	Main Control Board was replaced and parameters were not programmed.	1. Restore defaults. 2. Reprogram parameters.
See Manual	28		Encoderless TorqProve has been enabled but user has not read and understood application concerns of encoderless operation.	1. Read the “Attention” on page C-5 relating to the use of TorqProve with no encoder.
Shear Pin	63	③	Programmed [Current Lmt Val] has been exceeded. Enable/ Disable with [Fault Config 1] on page 3-42.	Check load requirements and [Current Lmt Val] setting.
Software Fault	88		Microprocessor handshake error.	Replace Main Control Board.
Software Fault	89		Microprocessor handshake error.	Replace Main Control Board.
SW OverCurrent	36	①	Drive output current has exceeded the 1ms current rating. This rating is greater than the 3 second current rating and less than the hardware overcurrent fault level. It is typically 200- 250% of the drive continuous rating	Check for excess load, improper DC boost setting. DC brake volts set too high.
TorqPrv Spd Band	20		Difference between [Commanded Speed] and [Encoder Speed] has exceeded the level set in [Spd Dev Band] for a time period greater than [Spd Band Integrat].	1. Check wiring between drive and motor. 2. Check release of mechanical brake.
Trnsistr OvrTemp	9	①	Output transistors have exceeded their maximum operating temperature.	1. Verify that maximum ambient temperature has not been exceeded. 2. Check fan. 3. Check for excess load.

Fault	No.	Type(1)	Description	Action
UnderVoltage	4	① ③	DC bus voltage fell below the minimum value of 407V DC at 400/480V input or 204V DC at 200/240V input. Enable/Disable with [Fault Config 1] (page 3-42).	Monitor the incoming AC line for low voltage or power interruption.
UserSet1 Chksum	101	②	The checksum read from the user set does not match the checksum calculated.	Re-save user set.
UserSet2 Chksum	102	②		
UserSet3 Chksum	103	②		

(1) See page 4-1 for a description of fault types.

Table 4.B Fault Cross Reference

No.(1)	Fault
2	Auxiliary Input
3	Power Loss
4	UnderVoltage
5	OverVoltage
7	Motor Overload
8	Heatsink OvrTemp
9	Trnsistr OvrTemp
12	HW OverCurrent
13	Ground Fault
15	Load Loss
16	Motor Thermistor
17	Input Phase Loss
20	TorqPrv Spd Band
21	Output PhaseLoss
24	Decel Inhibit
25	OverSpeed Limit
28	See Manual
29	Analog In Loss
33	Auto Rstrt Tries
36	SW OverCurrent

No.(1)	Fault
38	Phase U to Grnd
39	Phase V to Grnd
40	Phase W to Grnd
41	Phase UV Short
42	Phase VW Short
43	Phase UW Short
48	Params Defaulted
49	Drive Powerup
51	Flt QueueCleared
52	Faults Cleared
55	Cntl Bd Overtemp
63	Shear Pin
64	Drive OverLoad
69	DB Resistance
70	Power Unit
71- 75	Port 1-5 Adapter
77	IR Volts Range
78	FluxAmpsRef Rang
79	Excessive Load
80	AutoTune Aborted

No.(1)	Fault
81- 85	Port 1-5 DPI Loss
87	IXo VoltageRange
88	Software Fault
89	Software Fault
90	Encoder Quad Err
91	Encoder Loss
92	Pulse In Loss
93	Hardware Fault
100	Parameter Chksum
101-103	UserSet Chksum
104	Pwr Brd Chksum1
105	Pwr Brd Chksum2
106	Incompat MCB-PB
107	Replaced MCB-PB
108	Anlg Cal Chksum
120	I/O Mismatch
121	I/O Comm Loss
122	I/O Failure
130	Hardware Fault
131	Hardware Fault

(1) Fault numbers not listed are reserved for future use.

Clearing Alarms

Alarms are automatically cleared when the condition that caused the alarm is no longer present.

Alarm Descriptions

Table 4.C Alarm Descriptions and Actions

Alarm	No.	Type[1]	Description
AdjVoltRef Cflct	33	①	Invalid adjustable voltage reference selection conflict.
Analog In Loss	5	①	An analog input is configured for "Alarm" on signal loss and signal loss has occurred.
Bipolar Conflict	20	②	Parameter 190 [Direction Mode] is set to "Bipolar" or "Reverse Dis" and one or more of the following digital input functions is configured: "Fwd/Reverse," "Run Forward," "Run Reverse," "Jog Forward" or "Jog Reverse."
Brake Slipped	32	②	Encoder movement has exceeded the level in [BrkSlipCount] after the brake was set.
Decel Inhibt	10	①	Drive is being inhibited from decelerating.
Dig In ConflictA	17	②	Digital input functions are in conflict. Combinations marked with a "." will cause an alarm.

	Acc2/Dec2	Accel 2	Decel 2	Jog 1/2	Jog Fwd	Jog Rev	Fwd/Rev
Acc2/Dec2		.	.				
Accel 2	.						
Decel 2	.						
Jog 1/2					.	.	
Jog Fwd				.			.
Jog Rev				.			.
Fwd/Rev					.	.	

Dig In ConflictB	18	②	A digital Start input has been configured without a Stop input or other functions are in conflict. Combinations that conflict are marked with a "." and will cause an alarm.

	Start	Stop-CF	Run	Run Fwd	Run Rev	Jog 1/2	Jog Fwd	Jog Rev	Fwd/Rev
Start			.	.	.		.	.	
Stop-CF									
Run	.			.	.		.	.	
Run Fwd	.		.			.			.
Run Rev	.		.			.			.
Jog 1/2				.	.				
Jog Fwd	.		.						
Jog Rev	.		.						
Fwd/Rev				.	.				

Dig In ConflictC	19	②	More than one physical input has been configured to the same input function. Multiple configurations are not allowed for the following input functions.

Forward/Reverse
Speed Select 1
Speed Select 2
Speed Select 3
Run Forward
Run Reverse
Jog Forward
Jog Reverse
Run
Stop Mode B
Bus Regulation Mode B
Acc2 / Dec2
Accel 2
Decel 2

Alarm	No.	Type(1)	Description
Drive OL Level 1	8	①	The calculated IGBT temperature requires a reduction in PWM frequency. If [Drive OL Mode] is disabled and the load is not reduced, an overload fault will eventually occur.
Drive OL Level 2	9	①	The calculated IGBT temperature requires a reduction in Current Limit. If [Drive OL Mode] is disabled and the load is not reduced, an overload fault will eventually occur.
FluxAmpsRef Rang	26	②	The calculated or measured Flux Amps value is not within the expected range. Verify motor data and rerun motor tests.
Ground Warn	15	①	Ground current has exceeded the level set in [Gnd Warn Level].
Home Not Set	34	①	Configurable alarm set in parameter 259, bit 17. When set to "1," this alarm is displayed when any of the following occur: • parameter 88 is set to "7" (Pos/Spd Prof) • on power up and parameter 88 = "7" • recall user sets and parameter 88 = "7" Alarm is cleared when: • setting parameter 88 to a value other than "7" • reset defaults • parameter 259, bit 17 is cleared • a digital input is configured as "Set Home" and input is True • parameter 705, bit 9 is "Enabled" • parameter 700, bit 13 (At Home) is "Enabled" - position regulator will set this bit if device is "home"
In Phase Loss	13	①	The DC bus ripple has exceeded the level in [Phase Loss Level].
IntDBRes OvrHeat	6	①	The drive has temporarily disabled the DB regulator because the resistor temperature has exceeded a predetermined value.
IR Volts Range	25	②	The drive auto tuning default is "Calculate" and the value calculated for IR Drop Volts is not in the range of acceptable values. This alarm should clear when all motor nameplate data is properly entered.
Ixo Vlt Rang	28	②	Motor leakage inductance is out of range.
Load Loss	14		Output torque current is below [Load Loss Level] for a time period greater than [Load Loss time].
MaxFreq Conflict	23	②	The sum of [Maximum Speed] and [Overspeed Limit] exceeds [Maximum Freq]. Raise [Maximum Freq] or lower [Maximum Speed] and/or [Overspeed Limit] so that the sum is less than or equal to [Maximum Freq].
Motor Thermistor	12		The value at the thermistor terminals has been exceeded.
Motor Type Cflct	21	②	[Motor Type] has been set to "Synchr Reluc" or "Synchr PM" and one or more of the following exist: • [Torque Perf Mode] = "Sensrls Vect," "SV Economize" or "Fan/Pmp V/Hz." • [Flux Up Time] is greater than 0.0 Secs. • [Speed Mode] is set to "Slip Comp." • [Autotune] = "Static Tune" or "Rotate Tune."
NP Hz Conflict	22	②	Fan/pump mode is selected in [Torq Perf Mode] and the ratio of [Motor NP Hertz] to [Maximum Freq] is greater than 26.
PI Config Conflict	52	②	Check [PI Configuration], both "AdjVoltTrim" & "Torque Trim" are selected.

Alarm	No.	Type(1)	Description
Power Loss	3	①	Drive has sensed a power line loss.
Precharge Active	1	①	Drive is in the initial DC bus precharge state.
Prof Step Cflct	50	②	An error is detected in trend step(s). • Set if Sleep Mode is enabled. • Set if: any profile step uses “Encoder Incr” and/or “Enc Absolute” *and* [Motor Cntl Sel], parameter 53 is not set to “FVC Vector” *and* [Feedback Select], parameter 80 is not set to “Encoder” or “Simulator” *and* [Speed/Torque Mod], parameter 88 = “7” (Pos/Spd Prof). • a Step Type is configured for “Dig Input” and the Step Value is greater than 6, less than –6, or zero *or* the digital input selected with [Digital Inx Sel] is not set to “57, Prof Input.” • Cleared if none of the above occur.
PTC Conflict	31	②	PTC is enabled for Analog In 1, which is configured as a 0-20 mA current source in [Anlg In Config].
Sleep Config	29	②	Sleep/Wake configuration error. With [Sleep-Wake Mode] = “Direct,” possible causes include: drive is stopped and [Wake Level] < [Sleep Level]. “Stop=CF,” “Run,” “Run Forward,” or “Run Reverse.” is not configured in [Digital Inx Sel].
Speed Ref Cflct	27	②	[Speed Ref x Sel] or [PI Reference Sel] is set to “Reserved”.
Start At PowerUp	4	①	[Start At PowerUp] is enabled. Drive may start at any time within 10 seconds of drive powerup.
TB Man Ref Cflct	30	②	Occurs when: • “Auto/Manual” is selected (default) for [Digital In3 Sel], parameter 363 *and* • [TB Man Ref Sel], parameter 96 has been reprogrammed. No other use for the selected analog input may be programmed. Example: If [TB Man Ref Sel] is reprogrammed to “Analog In 2,” all of the factory default uses for “Analog In 2” must be reprogramed (such as parameters 90, 117, 128 and 179). See also Auto/Manual Examples on page 1-22. To correct: • Verify/reprogram the parameters that reference an analog input *or* • Reprogram [Digital In3] to another function or “Unused.”
TorqProve Cflct	49	②	When [TorqProve Cnfg] is enabled, [Motor Cntl Sel], [Feedback Select] and [Motor Fdbk Type] must be properly set (refer to page C-7).
UnderVoltage	2	①	The bus voltage has dropped below a predetermined value.
VHz Neg Slope	24	②	[Torq Perf Mode] = “Custom V/Hz” & the V/Hz slope is negative.
Waking	11	①	The Wake timer is counting toward a value that will start the drive.

(1) See page 4-1 for a description of alarm types.

Table 4.D Alarm Cross Reference

No.(1)	Alarm
1	Precharge Active
2	UnderVoltage
3	Power Loss
4	Start At PowerUp
5	Analog in Loss
6	IntDBRes OvrHeat
8	Drive OL Level 1
9	Drive OL Level 2
10	Decel Inhibt
11	Waking
12	Motor Thermistor
13	In Phase Loss

No.(1)	Alarm
14	Load Loss
15	Ground Warn
17	Dig In ConflictA
18	Dig In ConflictB
19	Dig In ConflictC
20	Bipolar Conflict
21	Motor Type Cflct
22	NP Hz Conflict
23	MaxFreq Conflict
24	VHz Neg Slope
25	IR Volts Range
26	FluxAmpsRef Rang

No.(1)	Alarm
27	Speed Ref Cflct
28	Ixo Vlt Rang
29	Sleep Config
30	TB Man Ref Cflct
31	PTC Conflict
32	Brake Slipped
33	AdjVoltRef Cflct
34	Home Not Set
49	Torq Prove Cflct
50	Prof Step Cflct
52	PI Config Conflict

(1) Alarm numbers not listed are reserved for future use.

Common Symptoms and Corrective Actions

Drive does not Start from Start or Run Inputs wired to the terminal block.

Cause(s)	Indication	Corrective Action
Drive is Faulted	Flashing red status light	Clear fault. • Press Stop • Cycle power • Set [Fault Clear] to 1 (See page 3-42) • “Clear Faults” on the HIM Diagnostic menu.
Incorrect input wiring. See pages 1-19 & 1-20 for wiring examples. • 2 wire control requires Run, Run Forward, Run Reverse or Jog input. • 3 wire control requires Start and Stop inputs. • Jumper from terminal 25 to 26 is required.	None	Wire inputs correctly and/or install jumper.
Incorrect digital input programming. • Mutually exclusive choices have been made (i.e., Jog and Jog Forward). • 2 wire and 3 wire programming may be conflicting. • Exclusive functions (i.e, direction control) may have multiple inputs configured. • Stop is factory default and is not wired.	None	Program [Digital Inx Sel] for correct inputs. (See page 3-55) Start or Run programming may be missing.
	Flashing yellow status light and “DigIn CflctB” indication on LCD HIM. [Drive Status 2] shows type 2 alarm(s).	Program [Digital Inx Sel] to resolve conflicts. (See page 3-55) Remove multiple selections for the same function. Install stop button to apply a signal at stop terminal.

Drive does not Start from HIM.

Cause(s)	Indication	Corrective Action
Drive is programmed for 2 wire control. HIM Start button is disabled for 2 wire control.	None	If 2 wire control is required, no action needed. See [Save HIM Ref] on page 3-34. If 3 wire control is required, program [Digital Inx Sel] for correct inputs. (See page 3-55)

Drive does not respond to changes in speed command.

Cause(s)	Indication	Corrective Action
No value is coming from the source of the command.	LCD HIM Status Line indicates "At Speed" and output is 0 Hz.	1. If the source is an analog input, check wiring and use a meter to check for presence of signal. 2. Check [Commanded Speed] for correct source. (See page 3-7)
Incorrect reference source has been programmed.	None	3. Check [Speed Ref Source] for the source of the speed reference. (See page 3-39) 4. Reprogram [Speed Ref A Sel] for correct source. (See page 3-19)
Incorrect Reference source is being selected via remote device or digital inputs.	None	5. Check [Drive Status 1], page 3-37, bits 12 and 13 for unexpected source selections. 6. Check [Dig In Status], page 3-40 to see if inputs are selecting an alternate source. 7. Reprogram digital inputs to correct "Speed Sel x" option. (See page 3-55)

Motor and/or drive will not accelerate to commanded speed.

Cause(s)	Indication	Corrective Action
Acceleration time is excessive.	None	Reprogram [Accel Time x]. (See page 3-26)
Excess load or short acceleration times force the drive into current limit, slowing or stopping acceleration.	None	Check [Drive Status 2], bit 10 to see if the drive is in Current Limit. (See page 3-37) Remove excess load or reprogram [Accel Time x].(See page 3-26)
Speed command source or value is not as expected.	None	Check for the proper Speed Command using Steps 1 through 7 above.
Programming is preventing the drive output from exceeding limiting values.	None	Check [Maximum Speed] (See page 3-17) and [Maximum Freq] (See page 3-10) to assure that speed is not limited by programming.

Motor operation is unstable.

Cause(s)	Indication	Corrective Action
Motor data was incorrectly entered or Autotune was not performed.	None	1. Correctly enter motor nameplate data. 2. Perform "Static" or "Rotate" Autotune procedure. (Param #061, page 3-12)

Drive will not reverse motor direction.

Cause(s)	Indication	Corrective Action
Digital input is not selected for reversing control.	None	Check [Digital Inx Sel], page 3-55. Choose correct input and program for reversing mode.
Digital input is incorrectly wired.	None	Check input wiring. (See page 1-15)
Direction mode parameter is incorrectly programmed.	None	Reprogram [Direction Mode], page 3-33 for analog "Bipolar" or digital "Unipolar" control.
Motor wiring is improperly phased for reverse.	None	Switch two motor leads.
A bipolar analog speed command input is incorrectly wired or signal is absent.	None	1. Use meter to check that an analog input voltage is present. 2. Check wiring. (See page 1-15) Positive voltage commands forward direction. Negative voltage commands reverse direction.

Stopping the drive results in a Decel Inhibit fault.

Cause(s)	Indication	Corrective Action
The bus regulation feature is enabled and is halting deceleration due to excessive bus voltage. Excess bus voltage is normally due to excessive regenerated energy or unstable AC line input voltages. Internal timer has halted drive operation.	Decel Inhibit fault screen. LCD Status Line indicates "Faulted".	1. See Attention statement on page P-4. 2. Reprogram parameters 161/162 to eliminate any "Adjust Freq" selection. 3. Disable bus regulation (parameters 161 & 162) and add a dynamic brake. 4. Correct AC input line instability or add an isolation transformer. 5. Reset drive.

Testpoint Codes and Functions

Select testpoint with [Testpoint x Sel], parameters 234/236. Values can be viewed with [Testpoint x Data], parameters 235/237.

No.(1)	Description	Units	Values		
			Minimum	Maximum	Default
01	DPI Error Status	1	0	255	0
02	Heatsink Temp	0.1 degC	–100.0	100.0	0
03	Active Cur Limit	1	0	32767	0
04	Active PWM Freq	1 Hz	2	10	4
05	Life MegaWatt Hr(2)	0.0001 MWh	0	214748.3647	0
06	Life Run Time	0.0001 Hrs	0	214748.3647	0
07	Life Pwr Up Time	0.0001 Hrs	0	214748.3647	0
08	Life Pwr Cycles	1	0	4294967295	0
09	Life MW-HR Fract(2)	1	0	4294967295	0
10	MW-HR Frac Unit(2)	1	0	4294967295	0
11	MCB Life Time	0.0001 Hrs	0	214748.3647	0
12	Raw Analog In 1	1	0		0
13	Raw Analog In 2	1	0		0
16	CS Msg Rx Cnt	1	0	65535	0
17	CS Msg Tx Cnt	1	0	65535	0
18	CS Timeout Cnt	1	0	255	0
19	CS Msg Bad Cnt	1	0	255	0
22	PC Msg Rx Cnt	1	0	65535	0
23	PC Msg Tx Cnt	1	0	65535	0
24-29	PC1-6 Timeout Cnt	1	0	255	0
30	CAN BusOff Cnt	1	0	65535	0
31	No. of Analog Inputs	1	0	x	0
32	Raw Temperature	1	0	65535	0
33	MTO Norm Mtr Amp	0.1 Amps	0	65535	0
34	DTO-Cmd Frequency	1	0	420	0
35	DTO-Cmd Cur Lim	0.1	0		0
36	DTO-Cmd DC Hold	1	0	32767	0
37	Control Bd Temp	0.1	0.0	60.0	0.0

(1) Enter in [Testpoint x Sel].

(2) Use the equation below to calculate total Lifetime MegaWatt Hours.

$$\left(\frac{\text{Value of Code 9}}{\text{Value of Code 10}} \times 0.1\right) + \text{Value of Code 5} = \text{Total Lifetime MegaWatt Hours}$$

Bypass Contactor Precaution

ATTENTION: An incorrectly applied or installed bypass system can result in component damage or reduction in product life. The most common causes are:

- Wiring AC line to drive output or control terminals.
- Improper bypass or output circuits not approved by Allen-Bradley.
- Output circuits which do not connect directly to the motor.

Contact Allen-Bradley for assistance with application or wiring.

Disconnecting MOVs and Common Mode Capacitors

PowerFlex 700 drives contain protective MOVs and common mode capacitors that are referenced to ground. To guard against drive damage, these devices must be disconnected if the drive is installed on a resistive grounded distribution system or an ungrounded distribution system where the line-to-ground voltages on any phase could exceed 125% of the nominal line-to-line voltage. To disconnect these devices, remove the jumper(s) listed in Table 1.D. Jumpers can be removed by carefully pulling the jumper straight out. See *Wiring and Grounding Guidelines for PWM AC Drives*, publication DRIVES-IN001 for more information on ungrounded systems.

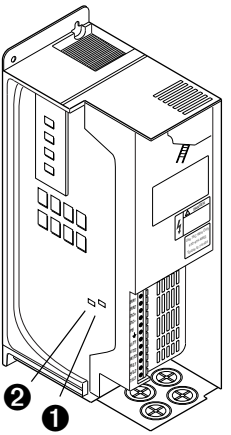
ATTENTION: To avoid an electric shock hazard, verify that the voltage on the bus capacitors has discharged before removing/installing jumpers. Measure the DC bus voltage at the +DC & –DC terminals of the Power Terminal Block. The voltage must be zero.

Table 1.D Jumper Removal (1)

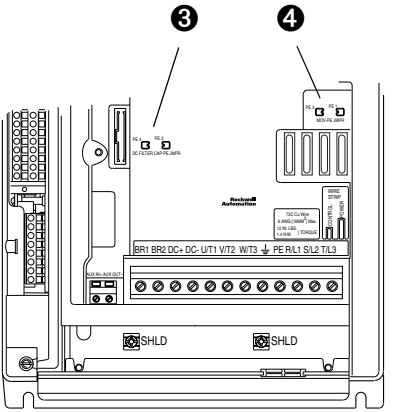
Frame	Jumper	Component	Jumper Location	No.
0, 1	PEA	Common Mode Cap.	Remove the I/O Cassette (page 1-16). Jumpers located on the Power Board (Figure 1.5).	❶
	PEB	MOV's		❷
2-4	PEA	Common Mode Cap.	Jumpers are located above the Power Terminal Block (see Figure 1.5).	❸
	PEB	MOV's		❹
5	Wire	Common Mode Cap.	Remove the I/O Cassette as described on page 1-16. The green/yellow jumper is located on the back of chassis (see Figure 1.5 for location). Disconnect, insulate and secure the wire to guard against unintentional contact with chassis or components.	❺
		MOV's Input Filter Cap.	Note location of the two green/yellow jumper wires next to the Power Terminal Block (Figure 1.5). Disconnect, insulate and secure the wires to guard against unintentional contact with chassis or components.	❻
6	Wire	Common Mode Cap. MOV's Input Filter Cap.	Remove the wire guard from the Power Terminal Block. Disconnect the three green/yellow wires from the two "PE" terminals shown in Figure 1.4. Insulate/secure the wires to guard against unintentional contact with chassis or components.	

(1) **Important:** Do Not remove jumpers if the distribution system is grounded.

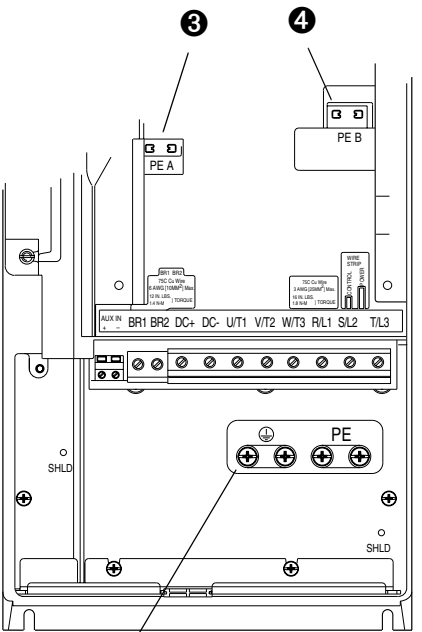
Figure 1.5 Typical Jumper Locations (see Table 1.D for description)



Frames 0 & 1
(I/O Cassette Removed)

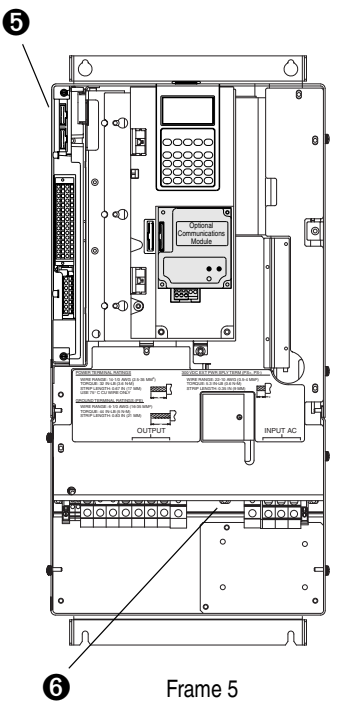


Frame 2



Important: Do Not discard or replace grounding hardware.

Frames 3 & 4



Frame 5

Installation, Operation and Maintenance Instructions

for AC Induction Motors
56- 6800 Frames (NEMA)
63 – 280 Frames (IEC)

MARATHON ELECTRIC
Contact Motor Customer Service at:
Phone: (715) 675-3311
www.marathonelectric.com

Form 5554E

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE
OWNER: READ AND SAVE THESE INSTRUCTIONS

SAFETY INSTRUCTIONS

⚠ This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ WARNING
Before installing, using, or servicing this product, carefully read and fully understand the instructions including all warnings, cautions, & safety notice statements. To reduce risk of personal injury, death and/or property damage, follow all instructions for proper motor installation, operation and maintenance.

These instructions are not intended as a complete listing of all details for installation, operation, and maintenance. If you have any questions concerning any of the procedures, STOP, and call the appropriate Regal-Beloit motor company.

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motor is suitable for use on Pulse Width Modulated (PWM) type VFD power. In addition, the nameplate must be marked with the inverter rating; for example, "2:1 CT", "2 to 1 Constant Torque", etc.

1.0 INSTALLER/OWNER/OPERATOR RESPONSIBILITY:

1.1 ELECTRICAL SAFETY

⚠ WARNING: ELECTRICAL SHOCK HAZARD

Electrical connections shall be made by a qualified electrical personnel in accordance with all applicable codes, ordinances and sound practices. Failure to follow these instructions could result in serious personal injury, death and/or property damage. Only qualified personnel who are familiar with the applicable National Code (USA = NEC) and local codes should install or repair electrical motors and their accessories.

⚠ WARNING: ELECTRICAL LIVE CIRCUIT HAZARD

Do not touch electrically live parts. Disconnect, lockout and tag input power supply before installing or servicing motor (includes accessory devices). Use a voltmeter to verify that power is off before contacting conductors.

⚠ WARNING: ELECTRICAL GROUNDING HAZARD

Failure to properly ground motors, per the National Electrical Code (NEC) Article 430 and local codes may cause serious injury or death to personnel. For general information on grounding refer to NEC Article 250. (Also see "Ground Connections section 3.4.4").

⚠ WARNING: AUTOMATIC RESET PROTECTOR HAZARD

Do not use automatic reset protectors if automatically restarting the motor will place personnel or equipment at risk. . Failure to follow this instruction could result in serious personal injury, death and/or property damage

⚠ WARNING: MANUAL RESET PROTECTOR HAZARD

If a tripped manual reset thermal protector is exposed to a temperature less than –7°C (20°F) it may reset and restart the motor automatically. If an application requires a motor with a manual reset thermal protector that will be operated at temperatures less than –7°C (20°F) contact the manufacturer to review the application / motor requirements. Failure to follow this instruction could result in serious personal injury, death and/or property damage

1.2 MECHANICAL SAFETY

⚠ WARNING: LOOSE PARTS HAZARD

Before starting the motor, remove all unused shaft keys and loose rotating parts to prevent them from flying off. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ WARNING: ROTATING PARTS HAZARD

Keep extremities, hair, jewelry and clothing away from moving parts. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

1.3 ENVIRONMENTAL SAFETY

⚠ WARNING: HAZARDOUS LOCATIONS

(1) The NEC and the local authority having jurisdiction must be consulted concerning the installation and suitability of motors for use in Hazardous Locations. The local authority having jurisdiction must make the final determination of what type of motor is required. The application and operation is beyond the control of the motor manufacturer.

(2) Division 1 Hazardous Locations motors can only be modified or reworked by the manufacturer or a facility that is Listed under UL's category "Motors and Generators, Rebuilt for use in Hazardous Locations". Failure to follow these instructions could result in serious personal injury, death and/or property damage.

(3) Do not use a Hazardous Locations motor with a Variable Frequency Drive (VFD) unless the motor nameplate specifically states that the

2.0 RECEIVING AND INSPECTION

2.1 INITIAL INSPECTIONS

2.1.1 CHECK PACKING LIST AND INSPECT the packaging to make certain no damage has occurred in shipment. If there is visible damage to the packaging, unpack and inspect the motor immediately. Claims for any damage done in shipment must be made by the purchaser against the transportation company.

2.1.2 TURN MOTOR SHAFT by hand to be certain that it rotates freely. Note: Shaft seals and bearing seals may add drag.

2.1.3 CHECK NAMEPLATE for conformance with purchase order requirements and compliance with power supply and control equipment requirements.

2.2 HANDLING:

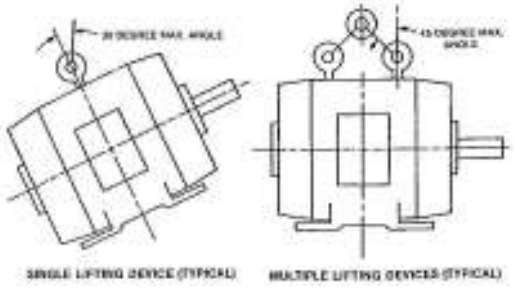
⚠ WARNING: FALLING OBJECT HAZARD

Eyebolts or lifting lugs, where provided, are intended for lifting only the motor and accessories mounted by the motor manufacturer (unless specifically stated otherwise on the motor). Utilizing the motor lifting provision to lift other components such as pumps and gear boxes could result in serious personal injury, death and/or property damage.

⚠ WARNING: FALLING OBJECT HAZARD

Before using the lifting provision, check the eyebolts and/or other lifting means to assure they are not bent or damaged and are completely threaded, seated & secured to the motor. Equipment to lift motor must have adequate lifting capacity. While lifting the motor DO NOT stand under or in the vicinity of the motor. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

2.2.1 LIFTING ANGLE LIMITATIONS



2.3 STORAGE: Motors, not put into service immediately, must be stored indoors in a clean, dry location. Avoid locations with large temperature swings that will result in condensation. Motors must be covered to eliminate airborne dust and dirt. If the storage location exhibits high vibration, place isolation pads under motor to minimize damage to motor bearings.

2.3.1 BEARING LUBRICATION: Bearings are grease packed at the factory; relubrication upon receipt of motor or while in storage is not necessary. If stored more than one year, add grease per lubrication instructions (Table 4-4) before start-up.

2.3.2 SHAFT ROTATION: It is recommended that the motor shaft be rotated 5 to 10 rotations every three months to distribute the grease in the bearings. This will reduce the chance for corrosion to form on the bearing rolling elements and raceways. Note: Shaft seals and bearing seals may add drag.

2.3.3 DAMP OR HUMID STORAGE LOCATIONS: Treat unpainted flanges, shafts, and fittings with a rust inhibitor. Apply appropriate power to the motor's space heaters (if so equipped)

3.0 INSTALLATION AND OPERATION

⚠ **WARNING:** Only qualified personnel who are familiar with the appropriate national code, local codes and sound practices should install or repair electrical motors and their accessories. Installation should conform to the appropriate national code as well as local codes and sound practices. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ **WARNING: ELECTRICAL LIVE CIRCUIT HAZARD**
Do not touch electrically live parts. Disconnect, Lockout and Tag input power supply before installing or servicing motor (includes accessory devices). Use a voltmeter to verify that power is off before contacting conductors.

3.1 LOCATION

3.1.1 SELECTING A LOCATION: Consideration should be given to environment and ventilation. Motors should be installed in an area that is protected from direct sunlight, corrosives, harmful gases or liquids, dust, metallic particles, and vibration. A motor with the proper enclosure for the expected operating condition should be selected. Provide accessible clearance for cleaning, repair, service, and inspections (See section 3.1.3 for construction clearances). The location should be considered for possible future motor removal / handling. The free flow of air around the motor should not be obstructed.

3.1.2 AMBIENT TEMPERATURE LIMITS: The ambient temperatures of the air inlet to the motor should not exceed 40°C (104°F) or be less than -30°C (-22°F) unless the motor nameplate specifically states an ambient temperature outside of these limits. The ambient inside an enclosure built around the motor shall not exceed the nameplate ambient. For ambient temperatures outside of these limits consult the motor manufacturer.

⚠ **CAUTION: INSULATION DEGRADATION WARNING**
Insulation at high temperatures ages at an accelerated rate. Each 10°C increase in temperature reduces the insulation life by one half.

⚠ **WARNING: HAZARDOUS LOCATIONS AMBIENT LIMIT:** Division 1 Hazardous Locations motors shall **NOT** be operated below –25°C (-13°F) ambient. (Low temperatures reduce the component mechanical properties.)

3.1.3 CONSTRUCTION SELECTION per LOCATION:

3.1.3.1 DRIPPROOF (OPEN) MOTORS are intended for use indoors where the atmosphere is relatively clean, dry, and non-corrosive. Recommended a minimum clearance of ½ the shaft height between vent openings and the nearest obstruction.

3.1.3.2 TOTALLY ENCLOSED MOTORS are suitable for indoor or outdoor standard service applications.

TEAO or AOM (Totally Enclosed Air Over) motors must be mounted in the air stream. When the motor nameplate states a minimum airflow the motor must be mounted in an air stream meeting this minimum value.

TEFC (Totally Enclosed Fan Cooled) motors must meet a minimum distance of ½ the shaft height between the fan guard grill openings and the nearest obstruction.

3.1.3.3 HAZARDOUS LOCATIONS MOTORS: Hazardous Locations motors are intended for installations in accordance with NEC Article 500. For all installations involving Hazardous Locations motors, consult the applicable national codes, local codes, and the authority having jurisdiction.

Division 1 Installations – includes Class I & II: Use only motors that are UL Listed and CSA Certified or UL Listed and UL Certified for Canada. These motors bear a separate nameplate that includes the UL Listing Mark and CSA Certification Mark or includes the UL Listing Mark and the UL Mark for Canada. This plate also bears the phrase: " Electric motor for Hazardous Locations" and is marked with the Class, Group and Operating Temperature Code.

Division 2 Installations – Class I only: Use only motors that are CSA Certified and bear the CSA Certification Mark. These motors include a phrase on the main motor nameplate that indicates the motor is CSA Certified for Class I, Division 2 / Zone 2 locations.

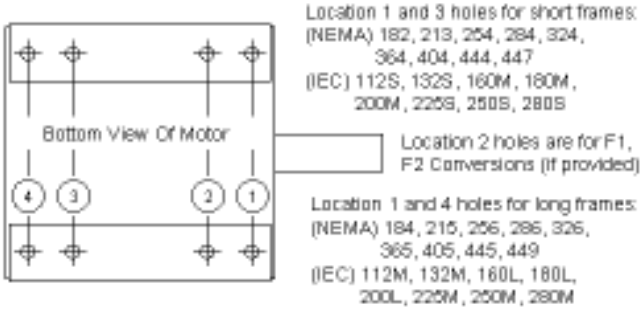
Division 2 Installation – Class II only: Use only Class II motors as described above under "Division I Installations".

⚠ **WARNING: EXPLOSION HAZARD**
A motor should never be placed in an area with a hazardous process or where flammable gases or combustible materials may be present unless it is specifically designed and nameplated for this type of service. Hazardous Locations motors are intended for installations in accordance with NEC Article 500. For all installations involving Hazardous Locations motors, consult the NEC, local codes, and the authority having jurisdiction. Failure to follow these instructions could result in serious personal injury, death and/or property damage. (For other limitations see section 1.3)

3.2 MOUNTING MOTOR:

3.2.1 RIGID BASE (FOOTED): The motor must be securely installed to a rigid foundation or a mounting surface to minimize vibration and maintain alignment between the motor shaft and the load's shaft. The mounting surfaces of the four mounting pads must be flat within 0.01 inches for 210 frame & smaller; 0.015 inches for 250 frame & larger. [IEC 0.25 mm for 130 frame & smaller, 0.38 mm for 160 frame & larger]. This may be accomplished by shims under the motor feet. For special isolation mounting, contact manufacturer for assistance

3.2.2 RIGID BASE HOLE SELECTION -6 OR 8 HOLES


Location 1 and 3 holes for short frames:
(NEMA) 182, 213, 254, 284, 324, 364, 404, 444, 447
(IEC) 112S, 132S, 160M, 180M, 200M, 225S, 250S, 280S
Bottom View Of Motor
Location 2 holes are for F1, F2 Conversions (if provided)
4
3
2
1
Location 1 and 4 holes for long frames:
(NEMA) 184, 215, 256, 286, 326, 365, 405, 445, 449
(IEC) 112M, 132M, 160L, 180L, 200L, 225M, 250M, 280M

3.2.3 VERTICAL MOUNTING:

CAUTION: ENCLOSURE PROTECTION CAUTION: Most Dripproof rigid base (footed) motors do **NOT** meet "Dripproof" requirements when mounted vertically. If the motor is located in unprotected environments, the addition of a drip cover may be available. Drip covers not available for cast iron rigid base motors.

⚠ **WARNING: FALLING OBJECT HAZARD**
The lifting provision on standard horizontal footed motors is not designed for lifting the motor in a vertical shaft up or shaft down position. (see 2.2.1 lifting angles). Lifting method / provisions for

mounting a rigid base (footed) motor vertically is the responsibility of the installer.

VERTICAL SHAFT DOWN: Most standard horizontal motors thru 449 Fr. (excluding brake motors) can be mounted in a vertical shaft down orientation. For vertical brake motors see section 3.3.6.2.

VERTICAL SHAFT UP:

⚠ **WARNING: HAZARDOUS LOCATIONS VERTICAL MOUNT:** Hazardous locations motors must **NOT** be mounted vertically shaft up without approval by the motor manufacturer. Without proper retaining provisions the rotor may move axially and contact components, creating a spark hazard.

Belted or Radial Load when mounted vertically: The following frame sizes / constructions with applied (axial) down loads within the limit stated are acceptable when mounted vertical shaft up.

Table 3-1 Belted or Radial Load Applications (All speeds)

Frame Size	Enclosure	Construction	Shaft Up OK	Max Applied Down Load[3]
56	TEFC & ODP	Steel	Yes	25 lbs
140	TEFC	Steel & Cast Iron	Yes	25 lbs
	ODP	Steel	Yes	25 lbs
180	TEFC	All	Yes	35 lbs
	ODP	Steel	Yes	35 lbs
210	TEFC	All	Yes	40 lbs
	ODP	Steel	Yes	40 lbs
250	TEFC	All	Yes	40 lbs
	ODP	Steel	Yes	40 lbs
		Cast Iron	No[2]	N/A
280-320	320 TTFC models	Cast Iron	Eng[1]	N/A
	All Other TEFC	Cast Iron & Aluminum	Yes	30 lbs
	ODP	Cast Iron	No[2]	N/A
	TEFC & ODP	Steel	Build Up Only[4]	N/A
360 & Up	TEFC	Cast Iron	Build Up Only[4]	N/A
	ODP	Cast Iron	No[2]	N/A
	TEFC & ODP	Steel	Build Up Only[4]	N/A

Notes:

1 For TEFC model numbers beginning with 324TTFC or 326TTFC consult the motor manufacturer to determine if a build up motor is required.

2 The max applied down load is any applied load external to the motor, including such things as sheave weight, fan loads, axial belt force, pump load, etc. If the application is direct drive with no applied radial load, consult the motor manufacturer.

3 "Build-up only", refers to motors that are specifically ordered and built for shaft up applications. It does not imply that all build-up motors are suitable for shaft up applications.

3.3 APPLICATION ASSEMBLY TO MOTOR:

⚠ **CAUTION: EQUIPMENT DAMAGE:**
Do not connect or couple motor to load until correct rotational direction is established.

3.3.1 GENERAL: PROPER ALIGNMENT of the motor and driven equipment minimizes vibration levels, maximizes bearing life, and extends the overall life of the machinery. Consult the drive or equipment manufacturer for more information.

⚠ **CAUTION: BEARING FAILURE**
During assembly do NOT force components onto the shaft. Striking or hammering the component may result in bearing damage.

3.3.2 DIRECT COUPLING: Use flexible couplings if possible. For applications that apply radial, axial or moment loading on the motor shaft see section 3.3.3.

⚠ **CAUTION: BEARING FAILURE**
Unless approved by the motor manufacturer do **NOT** direct couple a vertical shaft up or roller bearing motor. Direct coupling a vertical shaft up motor or a motor with a roller bearing may result in bearing damage.

3.3.3 DIRECT CONNECTED: Radial loading for direct connected equipment (gears, fans etc.) must be approved by the motor manufacturer unless within the maximum overhung load limits (Table 3-2). Combined loading (axial, radial and/or moments) must be approved by motor manufacturer. For belted loads see section 3.3.4.

Table 3-2 Maximum Radial Load (lbf) @ Middle of the Shaft Extension Length

Frame Number	Motor Rated RPM			
	3600	1800	1200	900
143T	106	166	193	210
145T	109	170	199	218
182T	187	230	261	287
184T	193	237	273	301
213T	319	317	470	510
215T	327	320	480	533
254T	500	631	729	793
256T	510	631	736	820
284T	-	866	990	1100
286T	-	871	1005	1107
324T	-	950	1100	1215
326T	-	950	1113	1230
364T	-	1078	1365	1515
365T	-	1078	1380	1540
404T	-	1388	1590	1762
405T	-	1400	1610	1780
444T	-	1580	1795	2005
445T	-	1520	1795	1985
447T	-	1455	1765	1985
449T	-	1640	1885	2130

Values based on 26,280 hrs B-10 Life
For "End of Shaft" Load multiply value by 0.88
To convert from lbf to N multiply value by 4.4482.

3.3.4 BELTED:

The goal of any belted system is to efficiently transmit the required torque while minimizing the loads on the bearings and shafts of the motor and driven equipment. This can be accomplished by following four basic guidelines:

1. Use the largest practical sheave diameter.
2. Use the fewest number of belts possible.
3. Keep sheaves as close as possible to support bearings.
4. Tension the belts to the lowest tension that will still transmit the required torque without slipping. It is normal for V-belts to squeal initially when line starting a motor

3.3.4.1 Sheave Diameter Guidelines:

In general, smaller sheaves produce greater shaft stress and shaft deflection due to increased belt tension. See Table 3-3 for recommended minimum sheave diameters. Using larger sheaves increases the contact with belts which reduces the number of belts required. It also increases the belt speed, resulting in higher system efficiencies. When selecting sheaves, do not exceed the manufacturer's recommended maximum belt speed, typically 6,500 feet per minute for cast iron sheaves. Determine belt speed by the following formula:

Figure 1

$$\textbf{BELT SPEED (Ft/min)} = \frac{Shaft\ RPM\ x\ 3.14\ x\ Sheave\ Dia\ (inches)}{12}$$

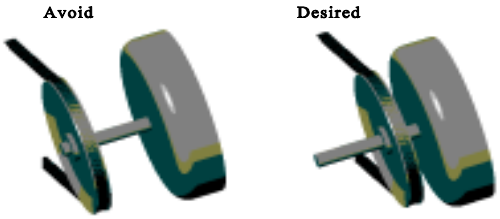
3.3.4.2 Number of Belts

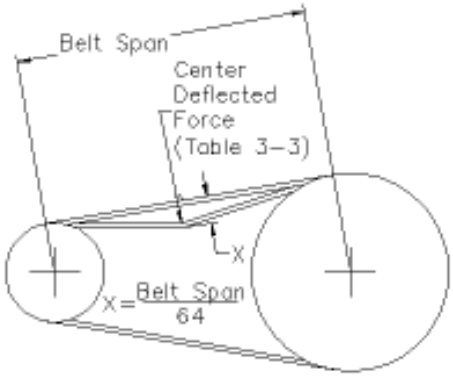
In general, use the fewest number of belts that will transmit the required torque without slipping. See Table 3-3 for recommended maximum number of belts. Each belt adds to the tension in the system, which increases load on the shafts and bearings. Belts are most efficient when operated at or near their rated horsepower.
If the sheaves have more grooves than the number of belts required, use the grooves closest to the motor.

3.3.4.3 Sheave Location

Install sheaves as close to the housing as possible to increase the bearing life of the motor and driven equipment

Figure 2





3.3.4.4 Belt Tension

CAUTION: Equipment Failure Caution
Belt tensioning by feel is **NOT** acceptable. Tensioning by "feel" can be very misleading, and can damage motor and equipment.
It is normal for V-belts to squeal initially when line starting a motor.

In general, belt tensions should be kept as loose as possible while still transmitting the required torque without slipping. Belt tensions must be measured with a belt tension gage. These inexpensive gages may be obtained through belt manufacturers, or distributors.

Proper belt tension is determined by measuring the force required to deflect the center of the belt a given distance. The proper deflection (in inches) is determined by dividing the belt span in inches by 64. Calculate the proper deflection and then see Table 3-3 for the required “Deflected Force” to achieve that deflection.
After tensioning the belt, rotate the sheaves for several rotations or operate the system for a few minutes to seat belts into the grooves, then re-tension the belts. New belts will stretch during use, and should be retensioned after the first eight hours of use.

Table 3-3 Recommended Minimum Sheave Diameters, Belt Type, Number of Belts and Deflected Force

Motor Hp	1200 rpm				1800 rpm				3600 rpm			
	Min Sheave Dia (in)	Belt Type	Max # of Belts	Avg. Deflected Force (lbs)	Min Sheave Dia (in)	Belt Type	Max # of Belts	Avg. Deflected Force (lbs)	Min Sheave Dia (in)	Belt Type	Max # of Belts	Avg. Deflected Force (lbs)
0.75	2.2	3VX	1	3.4	2.2	3VX	1	2.2	2.2	3VX	1	1.2
1	2.4	3VX	1	4.0	2.2	3VX	1	3.1	2.2	3VX	1	1.6
1.5	2.4	3VX	2	3.1	2.4	3VX	2	2.1	2.2	3VX	1	2.5
2	2.4	3VX	3	2.8	2.4	3VX	2	2.9	2.4	3VX	1	2.7
3	3.0	3VX	2	3.3	2.4	3VX	3	2.9	2.4	3VX	2	2.3
5	3.0	3VX	3	4.0	3.0	3VX	3	3.7	2.4	3VX	3	2.5
7.5	3.8	3VX	4	4.7	3.0	3VX	4	4.1	3.0	3VX	2	4.2
10	4.4	3VX	4	5.4	3.8	3VX	4	4.3	3.0	3VX	3	3.8
15	4.4	3VX	5	5.4	4.4	3VX	4	5.4	3.8	3VX	3	4.4
20	5.2	3VX	6	6.0	4.4	3VX	6	4.8	4.4	3VX	3	5.0
25	6.0	3VX	7	5.6	4.4	3VX	7	5.2	4.4	3VX	4	4.7
30	6.8	3VX	7	5.9	5.2	3VX	7	5.3				
40	6.8	5VX	4	11.6	6.0	3VX	7	6.0				
50	8.2	5VX	4	14.6	6.8	3VX	8	5.9				
60	8.2	5VX	5	14.1	7.4	5VX	4	13.3				
75	10.0	5VX	5	14.5	8.6	5VX	4	14.3				
100	10.0	5VX	6	16.0	8.6	5VX	6	13				
125	12.0	5V	7	14.1	10.5	5V	6	13.1				
150	13.2	5V	7	15.4	10.5	5V	7	13.4				
200	15.0	5V	8	16.0	13.2	5V	8	13.1				
250	15.0	8V	6	27.6	14.0	5V	9	13.8				
300	16.0	8V	7	27.1	14.0	5V/**8V**	11 / **7**	23.4				
350	16.5	8V	7	30.3	14.5	5V/**8V**	12 / **7**	26.0				
400	17.5	8V	8	29.1	15.0	5V/**8V**	13 / **8**	25.7				
450	18	8V	8	31.6	16.0	5V/**8V**	14 / **9**	25.2				
500	18.5	8V	9	30.7	16.5	5V/**8V**	15 / **9**	26.9				
600					17.5	8V	11	26.3				
700					19.0	8V	12	27.3				
800					20.0	8V	13	28.2				

Contact Motor Manufacturer when Belting 3600 rpm Motors Greater than 25 HP

Notes:

1. Horsepower is the nameplate motor horsepower, and RPM is the motor (driver) speed.
2. Minimum sheave diameters are from NEMA standards where applicable.
3. **For variable speed applications or values outside these recommendations, consult motor manufacturer.**
4. Selections are based on a 1.4 service factor, 5 to 1 speed ratio and various Power Transmission Manufacturers' catalogs.
5. These selections are for Narrow V-belt sections only. Consult manufacturer for details on conventional V-belt sections (A, B, C, D and E), or other belt types.
6. "Average Deflected Force is per section 3.3.4.4 of this document and is the force required to deflect the center of a belt 1/64 of the belt span distance. Tolerance on this force is ±1 lbf for forces ≤10 lbs, and ±2 lbs for forces >10 lbs as measured utilizing a belt tension gage.
7. When more than one belt is required the belts must be a matched set (matched for length).
8. If possible, the lower side of the belt should be the driving side to increase the length of wrap on the sheave).
9. For belted loads do not exceed 125% of 60 Hz operating RPM.

3.3.5 VFD (Variable Frequency Drives) OPERATION:

⚠ WARNING: VFD Motors with Reset Thermal Protectors
UL Recognition, UL Listing, or CSA certification does not apply to motors that are equipped with a manual or automatic reset thermal protector when the motor is operated on VFD power.

⚠ WARNING: Power Factor Correction Capacitors:
Power factor correction capacitors should never be installed between the drive and the motor.

⚠ CAUTION: VFD / Motor Setup:
It is the responsibility of the startup personnel during set up of the VFD / motor system to properly tune the drive to the motor for the specific application per the VFD user manual. The correct voltage boost and volts per hertz settings are application dependent and unique to each motor design. Failure to connect over temperature devices (when provided) will void the warranty.

3.3.5.1 Overspeed Capability:

Belted loads: Do not exceed 125% of 60 Hz operating RPM.

Table 3-4 Maximum Safe Continuous Speed (RPM) For Coupled and Direct Connected Loads

NEMA / [IEC] Frame Size	2-Pole	4, 6, or 8 Pole
56-180 [80-110]	7200 *	5400 *
210-250 [130-160]	5400 *	4200*
280 [180]	5400 *	3600
320 [200]	4500 *	3600
360 [225]	4500 *	2700
400-440 [250-280]	3600	2700
>440 [>280]	3600	1800

* = Fan cooled motors (Totally Enclosed & Hazardous Locations Motors) are limited to a maximum safe continuous speed of 4000 RPM **For higher speeds or shortened duty cycle contact motor manufacturer**

3.3.5.2 Cable Lengths: For optimum insulation life, limit VFD to motor cable lengths of general purpose motors

to Table 3-5 values. Definite purpose VFD motors may accommodate longer cable lengths. For additional information contact motor manufacturer.

Table 3-5 Max Cable Lengths General Purpose Motors
These values are based on 3 kHz carrier frequency. Add suitable VFD output-side filters when exceeding the listed values.

Frame Size	230V	460 V	575 V
NEMA 56-320	600 ft.	125 ft.	40 ft.
NEMA 360-5011	1000 ft.	225 ft.	60 ft.
IEC 80-200	180 m.	40 m.	12 m.
IEC 225-280.	300 m.	70 m.	18 m.

3.3.5.3 VFD Grounding: Equipment grounding conductors may be run in the same conduit as the AC motor power leads. This wire must be used as the equipment ground for the motor and not as the fourth current carrying wire of a "WYE" motor circuit. The grounded metal conduit carrying the output power conductors can provide EMI shielding, but the conduit does not provide an adequate ground for the motor; a separate grounding conductor must be used. Grounding the motor neutral (WYE) of a VFD powered motor may result in a VFD ground fault trip. Improper grounding of an inverter fed motor may result in frame voltages in excess of 500 Volts. Refer to Grounding section 3.4.4

3.3.5.4 VFD – Single Phase:

CAUTION: SINGLE PHASE MOTOR FAILURE:
Single Phase motors are **NOT** suitable for use on VFD power. Connecting a Single Phase Motor to a VFD voids the warranty.

3.3.5.5 Stray Voltage on Accessory Leads:

VFD's will couple stray (common-mode) voltage to motor-mounted RTDs, thermistors, thermostats and space heaters. The leads of these elements must be properly insulated and control input circuits must be designed to withstand this common-mode voltage.

3.3.6 ACCESSORIES / PROVISIONS:

3.3.6.1 General: Carefully read and understand the accessory manufacturer's instructions, supplied with motor. Contact the manufacturer for additional information.

3.3.6.2 Brake Motors:

CAUTION: Vertical Motor Premature Brake Failure
Motors with brakes that are designed for vertical applications are equipped with springs to support the brake pressure plate. Mounting a horizontal brake motor vertically shaft up or down may require a pressure plate spring modification. Failure to modify the brake for the vertical application may result in premature brake failure. If in question, consult brake literature or brake manufacturer.

Brake Solenoid Wiring: Do NOT connect the brake solenoid to the output of a VFD. The brake solenoids must be wired to 50/60 Hz line power

3.3.6.3 Space Heaters:

Motors provided with space heaters have two leads that are brought into the conduit box or into an auxiliary box. These leads are marked "H1", "H2" ("H3", "H4" if a second space heater is supplied). See the space heater nameplate on motor for heater rating.

WARNING: DIVISION 2 EXPLOSION HAZARD
The space heater temperature rating when used in Class I, Division 2 motors shall **NOT** exceed 80% of the auto ignition temperature of the hazardous gas or vapor. See the space heater nameplate on motor for heater Temperature Code and heater rating. Failure to follow this instruction could result in serious personal injury, death and/or property damage

3.3.6.4 Thermal Protection:

General Information: When thermal protection is provided, one of the following will be stamped on the nameplate:

1. **"THERMALLY PROTECTED**" This motor has built in thermal protection. Thermal protectors open the motor circuit electrically when the motor overheats or is overloaded. The protector cannot be reset until the motor cools. If the protector is automatic, it will reset itself. If the protector is manual, disconnect motor from power supply. After protector cools (five minutes or more) press the reset button and reapply power to the motor. In some cases a motor is marked "Auto" and the connection diagram on the motor will identify T'Stat leads – see "2 " below. (See warnings on Manual and Automatic reset protectors - section 1.1)

2. **"WITH OVERHEAT PROTECTIVE DEVICE**": This motor is provided with an overheat protective device that does not directly open the motor circuit. Motors nameplated with this phrase have either thermostats, thermisters or RTD's. The leads to these devices are routed into the motor conduit box or into an auxiliary box. The lead markings are defined on the nameplate (normally "P1", "P2") . The circuit controlled by the overheat protection device must be limited to a maximum of 600 volts and 360 volt-amps. See connection decal provided inside the terminal box cover. Failure to connect these over temperature devices (when provided) will void the warranty.

   WARNING: EXPLOSION HAZARD
   For Hazardous Locations motors provided with thermostats UL and the NEC require connection of thermostat leads into the control portion of a manual reset start circuit. Failure to follow this instruction could result in serious personal injury, death and/or property damage

Resistance Temperature Detectors (RTD): When winding and/or bearing RTDs are provided the RTD lead markings are defined on the nameplate. (Normally "R1", "R2", "R3" etc.)

3.3.6.5 RTD Alarm & Trip Settings:

Tables 3-6 & 3-7 are suggested initial RTD alarm and trip settings. For motors found to operate significantly below these values the settings may be reduced accordingly.

Table 3-6 Winding RTD – Temperature Limit (ºC) 40 ºC Max Ambient

Motor Load	Class B Temp Rise≤ 80ºC		Class F Temp Rise≤ 105ºC	
	Alarm	Trip	Alarm	Trip
Up to 1.0 SF	130	140	155	165
>1.0 to 1.15 SF	140	150	160	165

Table 3-7 Bearing RTD – Temperature Limit (ºC) 40 ºC Max Ambient

Ambient	Alarm	Trip
Up to 40**ºC**	95	100
> 40**ºC**	110	115
Bearings that are Heat Stabilized to 150 **ºC**	130	135

3.3.7 GUARDS:

WARNING: ROTATING PARTS HAZARD
When devices are assembled to the motor shaft, be sure to install protective devices such as belt guards, chain guards, and shaft covers. These devices must protect against accidental contact with extremities, hair, and clothing. Consider the application and provide guarding to protect personnel. Remove all unused shaft keys and loose rotating parts to prevent them from flying off and causing bodily injury. Failure to follow this warning could result in serious personal injury, death and/or property damage.

3.4 ELECTRICAL CONNECTIONS:

⚠ WARNING: ELECTRICAL HAZARDS

Before proceeding read Section 1-1 on Electrical Safety. Failure to follow the instructions in Section 1-1 could result in serious personal injury, death and/or property damage

3.4.1 POWER SUPPLY / BRANCH CIRCUIT

⚠ WARNING: POWER SUPPLY INCOMPATIBILITY HAZARD

Check power supply to make certain that voltage, frequency and current carrying capacity are in accordance with the motor nameplate. Failure to match motor nameplate values could result in serious personal injury, death and/or property damage

⚠ WARNING: BRANCH CIRCUIT SUPPLY HAZARD

Motor and control wiring, fusing, overload protection, disconnects, accessories and grounding must always conform to the applicable electrical codes as well as local codes and sound practices.

3.4.1.1 Branch Circuit Supply to a motor should include a disconnect switch, short circuit current fuse or breaker protection, motor starter (controller) and correctly sized thermal elements or overload relay protection.

3.4.1.2 Fuses, Breakers, Overload Relays

Short Circuit Current Fuses or Breakers are for the protection of the branch circuit. Starter or motor controller overload relays are for the protection of the motor. Each of these should be properly sized and installed per the applicable electrical codes as well as local codes and practices.

⚠ WARNING: PROTECTIVE DEVICE DISABLED HAZARD

DO NOT bypass or disable protective devices. Protection removal could result in serious personal injury, death and/or property damage

3.4.1.3 AC Power Supply Limits

Motors are designed to operate within the following limits at the motor terminals:

1- AC power is within +/- 10 % of rated voltage with rated frequency applied. (Verify with nameplate ratings) **OR**

2- AC power is within +/- 5% of rated frequency with rated voltage **OR**

3- A combined variation in voltage and frequency of +/- 10% (sum of absolute values) of rated values, provided the frequency variation does not exceed +/-5% of rated frequency.

4- For 3 phase motors the line to line full load voltage must be balanced within 1%.

5- If the motor is rated 208-230V, the voltage deviations must be calculated from 230V.

CAUTION: Reduced Motor Performance

Operation outside of these limits will degrade motor performance and increase operating temperature.

3.4.2 TERMINAL BOX:

3.4.2.1 Conduit Opening: For ease of connections, motors are typically provided with large terminal boxes. Most motors have conduit access in 90 degree increments, the terminal box conduit opening is typically provided via knockouts, holes with covers, or the terminal box is rotate-able. Fabricated conduit boxes may have a removable plate for the installer to provide correctly sized hole(s).

3.4.2.2 Hazardous Locations Motors:

⚠ WARNING: EXPLOSION HAZARDS

(1) Terminal Boxes mounted to motor with a pipe nipple: If a pipe nipple mounted terminal box is removed or rotated it must be reassembled with a minimum of five full threads of engagement.

(2) Component Removal: Do not set a terminal box component on its machined surfaces. Prior to component reassembly wipe clean all machined surfaces.

(3) Machined Surface Gap (Hazardous Locations Terminal Boxes): The gap between mating surfaces with the machined terminal box MUST BE LESS THAN 0.002 inches. This gap must be checked with a feeler gage along the entire perimeter. If there is visible damage to the mating surfaces, or if the gap between these surfaces exceeds 0.002 inches, DO NOT complete the installation and contact the motor manufacturer. Failure to follow these instructions could result in serious personal injury, death and/or property damage

3.4.3 LEAD CONNECTIONS

Electrical connections to be made per nameplate connection diagram or separate connection plate. In making connections follow the applicable electrical code as well as local codes and practices.

⚠ WARNING: ELECTRICAL CONNECTION HAZARD

Failure to correctly connect the motor leads and grounding conductor can result in injury or death. Motor lead connections can short and cause damage or injury if not well secured and insulated.

3.4.3.1 Wire Size (Single Phase) Requirements

The minimum wire size for Single Phase, 115 & 230 Volt Circuits must meet table 3-8 for a given distance between motor and either Fuse or Meter Box.

Table 3-8 Minimum Wire Gage Size Single Phase 115 & 230 Volt Circuits

Distance (Feet) - Motor to Fuse or Meter Box								
Motor	**100 Ft.**		**200 Ft.**		**300 Ft.**		**500 Ft.**	
HP	**115**	**230**	**115**	**230**	**115**	**230**	**115**	**230**
1/4	14	14	10	12	8	10	6	8
1/3	12	14	10	12	6	10	4	8
1/2	10	12	8	10	6	8	4	6
3/4	10	12	6	10	4	8	2	6
1	8	10	6	8	4	6		4
1 1/2	4	10	0	8		6		4
2		8		6		4		2
3		8		6		4		2
5		6		4		2		0

3.4.3.2 Extension Cords (Single Phase Motors):

Where an extension cord(s) is utilized to provide power to the motor the extension cord(s) must be…(1) the proper gauge size per table 3-8, (2) in good working condition (3) properly grounded.

3.4.4 GROUND CONNECTION(S):

⚠ WARNING: ELECTRICAL GROUNDING HAZARD

For general information on grounding (USA) refer to NEC Article 250. Improper grounding of an inverter fed motor may result in frame voltages in excess of 500 Volts. In making the ground connection, the installer must make certain that a good electrical connection is obtained between motor and grounding lead. Failure to properly ground motors, per the applicable national code (such as NEC Article 430) and local codes may cause serious injury or death to personnel.

Primary "Internal" Ground: A grounding conductor must be connected to the grounding terminal provided in the terminal housing. This grounding terminal is either a ground screw, ground lug, or a tapped hole to be used with a separately provided ground screw. The internal grounding feature is accessible inside the terminal housing and must be used as the primary grounding connection.

Secondary "External" Ground: Some motors are provided with a supplemental grounding terminal located on the external surface of the motor frame or feet. This external terminal is for supplemental bonding connections where local codes permit or require such connection

3.4.5 START UP:

⚠ WARNING: ELECTRICAL SHOCK HAZARD:

Be certain that all connections are secure and the conduit box cover is fastened in place before electrical power is connected. Failure to follow these instructions could result in serious personal injury, death, and/or property damage.

⚠ WARNING: LOOSE & ROTATING PARTS HAZARD
Before proceeding read Section 1-2 on Mechanical Safety. Failure to follow the instructions in Section 1-2 could result in serious personal injury, death and/or property damage

⚠ WARNING: EXCESSIVE SURFACE TEMPERATURE HAZARD
Motors with the temperature code stated on the nameplate are designed to operate within this limit. Improper application or operation can cause the maximum surface temperature to be exceeded. A motor operated in a Hazardous Location that exceeds this surface temperature limit increases the potential of igniting hazardous materials. *Therefore, motor selection, installation, operation, and maintenance must be carefully considered to ensure against the following conditions:* (1) Motor load exceeds service factor value, (2) Ambient temperature above nameplate value, (3) Voltages outside of limits (3.4.1.3), (4) Loss of proper ventilation, (5) VFD operation exceeding motor nameplate rating, (6) Altitude above 3300 feet / 1000 meters, (7) Severe duty cycles, (8) Repeated starts, (9) Motor stall, (10) Motor reversing, and (10) Single phase operation. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ CAUTION: HOT SURFACE
Normal motor surface temperatures may exceed 90 ° C (194° F). Touching the motor frame may cause discomfort or injury. Surface temperatures should only be measured with suitable instruments and not estimated by hand touch.

3.4.5.1 Start Up - No Load Procedure

1. **Check Instructions:** Before startup carefully read and fully understand these instructions including all warnings, cautions, and safety notice statements.
2. **Motor out of storage after more than three months:** Check winding insulation integrity with a Megger. If winding resistance to ground is less than 1.5 Meg-ohms consult the local authorized service shop before energizing the motor.
3. **Check Installation: Mechanical** - Check tightness of all bolts and nuts. Manually rotate the motor shaft to ensure motor shaft rotates freely. Note: Shaft & bearing seals will add drag.
   Electrical - Inspect all electrical connections for proper terminations, clearance, mechanical tightness and electrical continuity. Be sure to verify connections are made per the nameplate connection diagram or separate connection plate. Replace all panels and covers that were removed during installation before energizing the motor.
4. **Energize Motor: Check Rotation**
   If practical check motor rotation before coupling to the load. Unlock the electrical system. Momentarily provide power to motor to verify direction of rotation. If opposite rotation is required, lock out power before reconnecting motor. If motor has a rotational arrow only operate the motor in the rotation identified. Reapply power to ensure proper operation.
5. **Record No Load Amps, Watts & Voltage:**
   Recommend - To establish a baseline value check and record the no load amps, watts, and voltage.

3.4.5.2 Start Up – Load Connected Procedure

1. **Check Instructions:** Before startup carefully read and fully understand these instructions including all warnings, cautions, & safety notice statements.
2. **Coupling Installation:** Check that the connected equipment is properly aligned and not binding. Check that all guards and protective devices are properly installed.
3. **Energize Motor:** When all personnel are clear of the machine, apply power and verify that the load is not transmitting excessive vibration back to the motor though the shaft or the foundation. Verify that motor amps are within nameplate rating. For repeated starts see 3.4.5.3. The equipment can now be fully loaded and operated within specified limits as stated on the nameplate.

3.4.5.3 Jogging and/or Repeated Starts

Do not start more than twice in succession under full load. Repeated starts and/or jogs of induction motors can cause overheating and immediate failure. Contact the motor manufacturer if it is necessary to repeatedly start or jog the motor.

4.0 MAINTENANCE:

⚠ WARNING: Hazardous Locations Motor Repair HAZARD:
Division 1 Hazardous Locations motors can only be modified or repaired by the manufacturer or a facility that is Listed under UL's category "Motors and Generators, Rebuilt for use in Hazardous Locations". Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ WARNING: ELECTRICAL SHOCK HAZARD
Electrical connections are to be made by qualified electrical personnel in accordance with all applicable codes, ordinances and sound practices. Failure to follow these instructions could result in serious personal injury, death and/or property damage. Only qualified personnel who are familiar with the applicable national codes, local codes and sound practices should install or repair electric motors and their accessories.

⚠ WARNING: ELECTRICAL LIVE CIRCUIT HAZARD
Do not touch electrically live parts. Disconnect, lockout and tag input power supply before installing or servicing motor (includes accessory devices).

4.1 GENERAL INSPECTION

Inspect the motor approximately every 500 hours of operation or every three months, whichever occurs first. Keep the motor clean and the ventilation and fin openings clear. The following steps should be performed at each inspection:

4.1.1 VENTILATION: Check that the ventilation openings and/or exterior of the motor is free of dirt, oil, grease, water, etc, which can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.

4.1.2 INSULATION: Use a "Megger" periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. If winding resistance to ground is less than 1.5 Meg-ohms consult the local authorized service shop before re-energizing the motor.

4.1.3 ELECTRICAL CONNECTIONS: Check all electrical connectors to be sure that they are tight.

4.2 LUBRICATION & BEARINGS:

The lubricating ability of grease (over time) depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. Longer bearing life can be obtained if the listed recommendations are followed:

NOTE: If lubrication instructions are provided on the motor nameplate, the nameplate instructions will supersede these instructions. Motors marked "Permanently Lubricated" do not require additional service.

⚠ CAUTION: BEARING / MOTOR DAMAGE WARNING
Lubricant should be added at a steady moderate pressure. If added under heavy pressure bearing shield(s) may collapse. Over greasing bearings greatly increases bearing friction and can cause premature bearing and/or motor failure.

4.2.1 GREASE TYPE (unless nameplate states otherwise):
Nameplate Ambient Temperature between -30°C (-22°F) to 65°C (150°F) inclusive: Recommended grease for standard service conditions is Mobil Polyrex ® EM. Equivalent and compatible greases include: Texaco Polystar RB, Rykon Premium #2, Pennzoil Pen 2 Lube, Chevron SRI & Mobil SHC 100.

Nameplate Ambient Temperature below -30°C (-22°F): Special low temperature grease is recommended, such as Aeroshell 7 or Beacon 325 for ball bearings and Mobil SHC 100 for roller bearings.

Nameplate Ambient Temperature above 65°C (150°F): Dow Corning DC44 or equivalent, a special high temperature grease is required. Note that Dow Corning DC44 grease does not mix with other grease types.

For RTD settings see Table 3-7.

4.2.2 BEARING OPERATING TEMPERATURE:

CAUTION: HOT SURFACE

The external surface temperature of the end shield (bracket) bearing hub may reach 100° C (212° F) during normal operation. Touching this surface may cause discomfort or injury. Surface temperatures should only be measured with suitable instruments and not estimated by hand touch.

4.2.3 LUBRICATION INTERVALS: (For motors with regreasing provisions)

Eq. 4.2 Lubrication Interval = [(Table 4-1) hrs] x [Interval Multiplier (Table 4-2)] x [Construction Multiplier (Table 4-3)]

Table 4-1 Lubrication Intervals (Hours) These values are based on average use.

NEMA / [IEC] Frame Size	Operating Speed – RPM (See Table 3.4 for Maximum Operating Speed)					
	<7200	<5400	<4500	<3600	<1800	<1200
56-180 [80-110]	2500 Hrs.	4000 Hrs	5000 Hrs	6000 Hrs.	17000 Hrs.	20000 Hrs.
210-250 [130-160]		2500 Hrs	4000 Hrs	5000 Hrs.	12000 Hrs.	16000 Hrs.
280 [180]		2000 Hrs	3000 Hrs	4000 Hrs.	10000 Hrs.	14000 Hrs.
320 [200]			2000 Hrs	3000 Hrs.	9000 Hrs.	12000 Hrs.
360 [225]			1500 Hrs	2000 Hrs.	8000 Hrs.	10000 Hrs.
400-440 [250 – 280]				1500 Hrs.	4000 Hrs.	7000 Hrs.
>440 [>280]				1000 Hrs.	3000 Hrs.	5000 Hrs.

Seasonal Service: If motor remains idle for more than six months, Lubricate at the beginning of the season, then follow lubrication interval.

Do not exceed maximum safe operating speed Table 3-4 without manufacturer's approval

Table 4-2 Service Conditions

Use highest level Multiplier: Maximum Ambient Temperature and Contamination are independent factors

Severity of Service	Maximum Ambient Temperature	Atmospheric Contamination	Multiplier
Standard	Less than 40° C (104° F)	Clean, Slight Corrosion, indoors, less than 16 hrs per day	1.0
Severe	Above 40° C (104° F) to 50° C	Moderate dirt or Corrosion or outdoors or more than 16 hrs per day	0.5
Extreme	Greater than 50° C or Class H Insulation	Severe dirt or Abrasive dust or Corrosion	0.2

Table 4-3 Construction Multiplier

Construction	Multiplier
Angular Contact or Roller Bearing	0.5
Vertical Motor	0.5
All others	1.0

Table 4-4 Relubrication Amounts

Frame Size		Volume		
NEMA	IEC	Cu. In.	Fluid oz	ml
48-56	80	0.25	0.14	4.0
143-145	90	0.25	0.14	4.0
182-184	110	0.50	0.28	8.0
213-215	130	0.75	0.42	12.5
254-256	160	1.00	0.55	16.0
284-286	180	1.50	0.83	25.0
324-326	200	2.00	1.11	33.0
364-365	225	3.00	1.66	50.0
404-405	250	3.80	2.11	62.0
444-449	280	4.10	2.27	67.0
>449	>280	4.50	2.50	74.0

For regreasing while operating multiply volume by 125%.

4.2.4 LUBRICATION PROCEDURE: (For Motors with Regreasing Provisions)

CAUTION: BEARING DAMAGE WARNING
Added grease must be compatible with the original equipment's grease. If a grease other than those stated in 4.2.1 is to be utilized contact the motor manufacturer. Nameplate information supersedes section 4.2.1 (GREASE TYPE). New grease must be free of dirt. Failure to follow these instructions and procedure below may result in bearing and/or motor damage.

For an extremely dirty environment, contact the motor manufacturer for additional information.

LUBRICATION PROCEDURE:

1. Clean the grease inlet plug or zerk fittings prior to regreasing.
2. (If present) Remove grease drain plug and clear outlet hole blockage.

CAUTION: GREASE DRAIN PLUGGED:
Old grease may completely block the drain opening and must be mechanically removed prior to regreasing. Forcing a blocked drain open by increased greasing pressure may collapse bearing shields and / or force excess grease through the bearings and into the motor.

3. Add grease per Table 4-4
4. Re-install grease inlet and drain plugs (if removed).

WARNING: EXPLOSION HAZARD
Do NOT energize a Hazardous Locations motor without all grease fittings properly installed.

4.2.5 EXAMPLE: LUBRICATION
Assume - NEMA 286T (IEC 180), 1750 RPM Vertical motor driving an exhaust fan in an ambient temperature of 43° C and the atmosphere is moderately corrosive.

1. Table 4-1 list 10,000 hours for standard conditions.
2. Table 4-2 classifies severity of service as "Severe" with a multiplier of 0.5.
3. Table 4-3 lists a multiplier value of 0.5 for "Vertical"
4. (Eq. 4.2) Interval = 10,000 hrs x 0.5 x 0.5 = 2500 hrs

Table 4-4 shows that 1.5 in^3 of grease is to be added.

Relubricate every 2,500 hrs of service with 1.5 in^3 of recommended grease.

4.3 TROUBLE-SHOOTING

WARNING: READ INSTRUCTIONS:
Before trouble-shooting a motor, carefully read and fully understand the warnings, cautions, & safety notice statements in this manual.

WARNING: Hazardous Locations Motor Repair:
Motors nameplated for use in Division 1 Hazardous Locations can only be disassembled, modified or repaired by the plant of manufacturer or a facility that is Listed under UL's category "Motors and Generators, Rebuilt for use in Hazardous Locations". Failure to follow these instructions could result in serious personal injury, death and/or property damage

CAUTION: DISASSEMBLY APPROVAL REQUIRED:
Motor disassembly must be performed by a party approved by the motor manufacturer. To disassemble the motor without approval voids the warranty.

4.3.1 GENERAL TROUBLE-SHOOTING WARNINGS

1. **DISCONNECT POWER TO THE MOTOR BEFORE PERFORMING SERVICE OR MAINTENANCE.**
2. **Discharge all capacitors before servicing motor.**
3. **Always keep hands and clothing away from moving parts.**
4. **Be sure required safety guards are in place before starting equipment.**
5. **If the problem persists contact the manufacturer.**

4.3.2 Motor Trouble-shooting Cause / Corrective Action - Table 4-5

Issue:		Likely Cause:	Corrective Action:
Motor fails to start upon initial installation:			
	A.)	Supply voltage is too low or is severely unbalanced (one phase is low or missing).	(1) Check power supply fuses (2) Match motor lead wiring to nameplate connection diagram and supply voltage (3) Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3). Correct as needed (4) Obtain correct motor to match actual supply voltage.
	B.)	Motor leads are miswired at conduit box.	
	C.)	Driven load exceeds motor capacity	(1) Verify that motor & load turn freely (2) Disconnect motor from load & ensure motor turns freely. Note: Roller bearings make noise when motor is uncoupled and shaft is rotated (3) Verify that motor starts when disconnected from load (4) Remove excessive / binding load if present.
	D.)	Load is jammed.	
	E.)	Fan guard is bent and making contact with fan	Replace fan guard & fan (if blades are damaged)
	F.)	VFD with power factor capacitors installed	Remove power factor correction capacitors if equipped
	G.)	VFD with motor neutral lead grounded	Ensure that motor neutral lead is ungrounded
	H.)	VFD programmed incorrectly	(1) Repeat checks listed above (2) Verify that VFD current limit and starting boost are set correctly (5) Double-check motor and feedback parameter settings and VFD permissives (6) Repeat autotune (for vector drives) procedure (7) Consult VFD supplier.
Motor has been running, then slow down, stalls, or fails to restart:			
	A.)	Supply voltage has drooped or has become severely unbalanced	(1) Replace fuse or reset circuit breaker. Allow motor to cool down before resetting manual protector on motor. **Warnings** - See section 1.1 for automatic and manual reset protector warnings (2) Verify that rated and balanced supply voltage has been restored before restarting motor. Measure voltage during restart. Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3).
	B.)	Motor is overloaded	(1) Verify that motor & load turn freely. Repair binding components as needed (2) Reduce driven load to match motor capacity or increase motor size to match load requirements.
	C.)	Motor bearings are seized	
	D.)	Load Is jammed.	
	E.)	VFD will not restart motor after tripping	(1) Check fault codes on VFD and follow VFD troubleshooting procedures (2) Verify that VFD input voltage is balanced and within limits (3) Remove excessive mechanical load if present.
	F.)	Capacitor failure on single phase motor (if equipped)	**Warning: Potential Shock Hazard**: Contact service shop to check capacitor.
Motor takes too long to accelerate:			
	A.)	Motor leads are not connected correctly	Match motor lead wiring to nameplate diagram.
	B.)	Supply voltage has drooped or become severely unbalanced.	(1) Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3). Correct as needed (2) Obtain correct motor to match actual supply voltage.
	C.)	Load exceeds motor capability	Determine correct motor size and contact motor representative to obtain replacement motor.
	D.)	Faulty start capacitor (Single Phase)	Motor may be too small for load. Record acceleration time. Start capacitors may fail if acceleration time exceeds 3 seconds.
	E.)	Mechanical Failure	(1) Check to make sure motor & load turn freely (2) Disconnect motor from load & ensure motor turns freely
Motor rotates in the wrong direction:			
	A.)	Incorrect wiring connection at motor	[Single Phase] Reconnect motor according to wiring schematic provided. Note: Some motors are non-reversible
			[Three Phase] Interchange any two power supply (phase) leads.
Motor overheats or overload protector repeatedly trips			
	A.)	Driven Load is excessive	(1) If motor current exceeds nameplate value, ensure that driven load has not increased. Correct as needed. (2) If new motor is a replacement, verify that the rating is the same as the old motor. If previous motor was a special design, a general purpose motor may not have the correct performance.
	B.)	Ambient temperature too high	Most motors are designed to operate in an ambient up to 40 °C. (See section 4.2.2 Hot Surface Caution)
	C.)	Motor cooling fins and/or vent openings blocked	Remove foreign materials – clear vent openings, fan guard air inlets and frame fins (TEFC motors)
	D.)	Insufficient Air Flow	TEAO (Totally Enclosed Air Over) motors: Measure airflow next to motor surface and obtain minimum requirements from motor manufacturer.

	E.)	Motor is started too frequently	See section 3.4.5.3
	F.)	Supply voltage too low, too high, or unbalanced	(1) Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3) Correct as needed (2) Reconnect motor per input voltage (3) Obtain correct motor to match power supply.

Motor Vibrates

	A.)	Motor misaligned to load.	Realign load
	B.)	Load out of balance (Direct drive application)	(1) Ensure that load is dynamically balanced: (2) Remove motor from load and inspect motor by itself. Verify that motor shaft is not bent. Rule of thumb is 0.002" runout for shafts extension lengths up to 3.00". Add 0.0005" per every additional inch of shaft length beyond 3.00".
	C.)	Uneven tension on multiple belts	Mixing new with used belts. Replace multiple belt applications with a complete set of matched belts.
	D.)	Driven load operating at resonant point / natural frequency.	(1) De-energize motor and record vibration as load coasts from 100% speed to 0 RPM. If vibration drops immediately, vibration source is electrical. If levels do not drop immediately, source is mechanical (2) Redesign system to operate below the resonant point (3) On VFD-driven loads, program skip frequencies to bypass resonant points (4) Increase carrier frequency to obtain <3% THD current (5) On variable torque loads reduce volts/hertz below base speed.
	E.)	VFD torque pulsations	(1) Adjust VFD to obtain <3% THD current @ rated motor current (2) Adjust VFD stability for smooth operation. Vector drives may be unstable at light load.
	F.)	Motor miswired at terminal box	Match motor lead wiring to nameplate connection diagram.
	G.)	Uneven, weak or loose mounting support.	Shim, strengthen or tighten where required.
	H.)	Motor bearings defective	Test motor by itself. If bearings are bad, you will hear noise or feel roughness. Roller bearings are normally noisy when operated without load. If sleeve bearing, add oil per nameplate instructions. For motors with regreasing provisions, add grease per relubricating instructions (see section 4.2.3). If noise persists contact warranty service.
	I.)	Motor out of balance	Disconnect from load. Set motor on rubber pads on solid floor. Secure a ½ height key in shaft keyway and energize from balanced power supply @ rated voltage. Record vibration levels and compare with appropriate standards. If excessive vibration persists contact motor manufacturer.

Bearings repeatedly fail.

	A.)	Load to motor may be excessive or unbalanced	(1) If belt drive check system per section 3.3.4. (2) Other than belting, check loading on motor shaft. An unbalanced load will also cause the bearings to fail. (3) Check runouts of mating components, such as a C-face and pump flange.
	B.)	Bearings contaminated.	Motor enclosure not suitable for environment. Replace with correct enclosure construction
	C.)	Incorrect grease or bearings for ambient extremes.	See section 4.2.1
	D.)	VFD bearing damage	Ground brush, common mode filter, or insulated bearings must be added. Contact motor manufacturer.

Motor, at start up, makes a loud rubbing, grinding, or squealing noise.

	A.)	Contact between rotating and stationary components	Belt squeal during across the line starting is normal: (1) Verify that supply voltage is within limits (see section 3.4.1.3). (2) Ensure that motor lead wiring matches nameplate connection diagram: (3) Isolate motor from load. (4) To locate point of contact turn motor shaft by hand. (5) If point of contact is not located contact motor service shop.

Start capacitors repeatedly fail.

	A.)	The motor acceleration time is too long	Motor may be too small for load. Record acceleration time. Start capacitors may fail if acceleration time exceeds 3 seconds.
	B.)	Motor is being started too frequently	Excessive starting will damage motor capacitors. Contact motor manufacturer if motor is started more than 20 times/hour or if acceleration time exceeds 3 seconds.
	C.)	Motor voltage low	Verify that voltage at the motor terminals is within limits (see section 3.4.1.3).
	D.)	Defective start switch inside motor	Motor internal switch failure overheats start capacitor. Contact service shop or motor manufacturer.

Run capacitor fails.

	A.)	High ambient temperature	Verify that the ambient does not exceed motor's nameplate value

	B.)	Input voltage exceeds limit	Verify that voltage to the motor terminals is within limits (see section 3.4.1.3).
	C.)	Power surge to motor (caused by lightning strike or other high transient voltage).	If a common problem, install surge protector.

JOHNSON CONTROLS

Johnson Controls, Inc.
Systems Products Division
507 East Michigan Street
P.O. Box 423
Milwaukee, WI 53201

Series A19 Temperature Controls—Single-Pole, Single-Throw and Single-Pole, Double-Throw Models with NEMA 1 Enclosure

Application

These controls are designed to cover a broad range of general purpose operating temperature control applications in the refrigeration, air conditioning and heating field with a minimum number of models. Typical applications are: frozen food cases, display cases, beverage coolers, milk coolers, etc. Various control ranges are available.

Controls are supplied with an adjustable range (except models with factory sealed settings) and adjustable or nonadjustable differential.

All Series A19 temperature controls are designed for use only as operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add devices (safety, limit controls) or systems (alarm, supervisory systems) that protect against, or warn of, control failure.

Installation

Follow equipment manufacturer's instructions if provided. If instructions are not provided proceed as follows:

Mounting

Controls are normally mounted to a surface through holes in back of case.

CAUTION: On rough mounting surfaces use the top two mounting holes only. When these controls are mounted on an uneven surface using screws in all four holes, the case can be twisted enough to affect the control's calibration and operation.

For closed tank applications without well assembly Part No. FTG13A-600R packing nut assembly may be supplied. See Fig. 3 for sequence of installation. Put parts over support tube section of element, placing bulb into tank. Tighten 1/2" NPT adapter. Screw packing nut into adapter with the retaining washers and packing in place as shown.

To install models supplied with bulb well, first install bulb well into tank. Remove bushing from bulb well and slide bushing over capillary. Replace bushing into bulb well. Push bulb into position in bottom of well. Tighten set screw in end of adapter to hold bulb in position. See Fig. 4 for bulb well illustration.

CAUTION: Do not dent or deform the sensitive bulb of this control. A dent or deformation will change the calibration and cause the control to cycle at a temperature lower than the dial setting. When the bulb mounting clip is used to mount the bulb near the refrigerant tubing, be sure the sheet metal screw does not pierce the tubing.

Adjustments

The A19 temperature controls may be supplied with an external range adjustment and screwdriver slot as shown in Fig. 1, range adjustment knob or solid cover as shown in Fig. 7. Solid cover models with calibrated dial are adjusted by removing the cover and moving dial so the desired setting is in line with the dial pointer on the stop bracket. (See Fig. 8.) Convertible adjustment models can be field converted from concealed screwdriver slot adjustment to knob adjustment or external screwdriver slot adjustment. They are supplied with a snap-in plug in the cover to provide

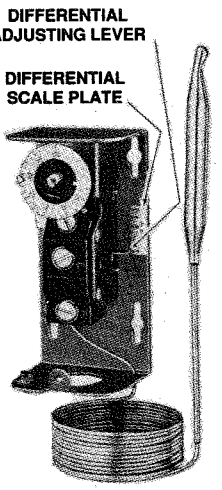


Fig. 1 — An A19 with external range adjustment and screwdriver slot.

concealed screwdriver slot adjustment. For knob adjustment remove the snap-in plug and press the knob onto the slotted shaft. For external screwdriver slot adjustment remove the snap-in plug. The convertible adjustment models with remote bulb include a bulb mounting clip.

Dial settings normally indicate the cutout setting unless otherwise specified by the equipment manufacturer. Models with SPDT

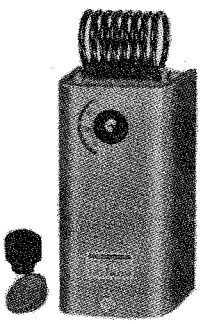


Fig. 2 — The Space Thermostats with convertible adjustment have a snap-in plug in the cover, built-in screwdriver slot and a knob for field installation.

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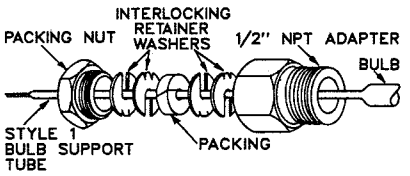
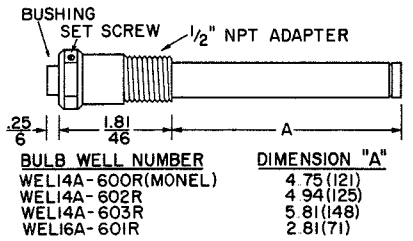


Fig. 3 — Part No. FTG13A-600R packing nut assembly. (Used with swaged bulb with support tube for direct immersion application.)



BULB WELL NUMBER	DIMENSION "A"
WELI4A-600R(MONEL)	4.75(121)
WELI4A-602R	4.94(125)
WELI4A-603R	5.81(148)
WELI6A-601R	2.81(71)

Fig. 4 — Bulb well for liquid immersion applications where a temperature bulb may be removed without draining tank.

contacts are normally set so the red (common) to yellow contacts open at the dial setting.

Models with adjustable differential and ranges of 20/80° F (–5/28° C), –30/50° F (–35/10° C) and –30/100° F (–35/40° C) have a differential scale plate showing differential in degrees. Other ranges have a scale plate (see Fig. 1) with a multiplier shown. For example when "MIN" differential is 5F° (2.8C°) then x2 is 10F° (5.6C°), x3 is 15F° (8.3C°), etc. The controls are supplied with adjusting lever at minimum differential stamped on the control. To adjust move the lever to the differential required.

Low cutout or high cutout stop supplied on certain models (specified by the equipment manufacturer).

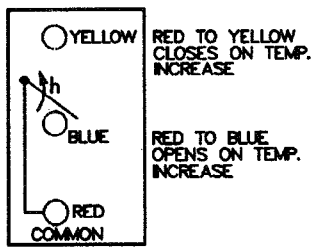


Fig. 5 — Terminal arrangement of SPDT models.

WIRE RED TO YELLOW FOR COOLING

If high or low cutout stop adjustment is required proceed as follows:

1. Set dial to temperature at which stop is desired.
2. Remove cover of the control.
3. Loosen the cutout stop screw, slide the screw to the front of the temperature control against the plastic step behind the dial and tighten the screw. (See Fig. 8.) Sometimes an exact stop setting is not possible and stop must be set to the closest step corresponding to dial setting required.
4. Replace cover.

Wiring

CAUTION: Disconnect power supply before wiring connections are made to avoid possible electrical shock or damage to equipment.

All wiring should conform to the National Electrical Code and local codes. Single-pole, double-throw models should be wired as shown in terminal drawing. Use copper conductor only. (See Fig. 5.)

CAUTION: Use terminal screws furnished (8–32 x 1/4" binder head). Substitution of other screws may cause problems in making proper connections.

Checkout Procedure

Before applying power, make sure installation and wiring connections are according to job specifications. After the necessary mechanical adjustment and electrical connections have been made, an operational checkout is recommended.

Adjust the control set point to put the system in operation and observe at least three complete operating cycles to be sure that all components are functioning correctly.

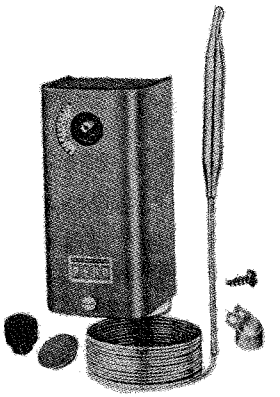


Fig. 6 — The A19 with remote bulb and convertible adjustment has a snap-in plug in the cover, a knob for field installation and a bulb mounting clip.

If the system fails to operate, recheck the wiring and components.

Repairs and Replacement

Field repairs must not be made. For a replacement control contact the nearest Johnson Controls wholesaler.

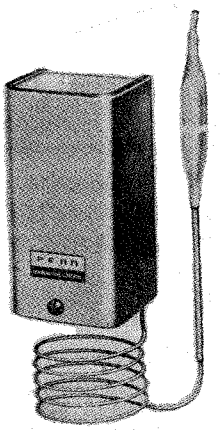


Fig. 7 — An A19 with solid cover and concealed adjustment.

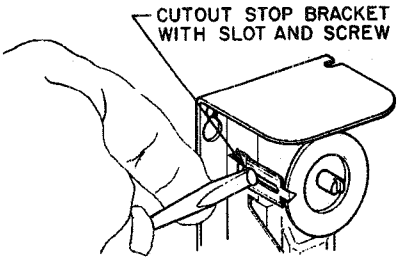


Fig. 8 — All models have a screw type cutout stop. The stop screw must be loosened and moved to the stop setting desired. Tighten screw after setting is made.

12 Trouble-Shooting

If the Air Conditioner should require service, we have compiled a trouble-shooting chart to assist your service personnel. If additional assistance is required please contact Pfannenberg Inc.

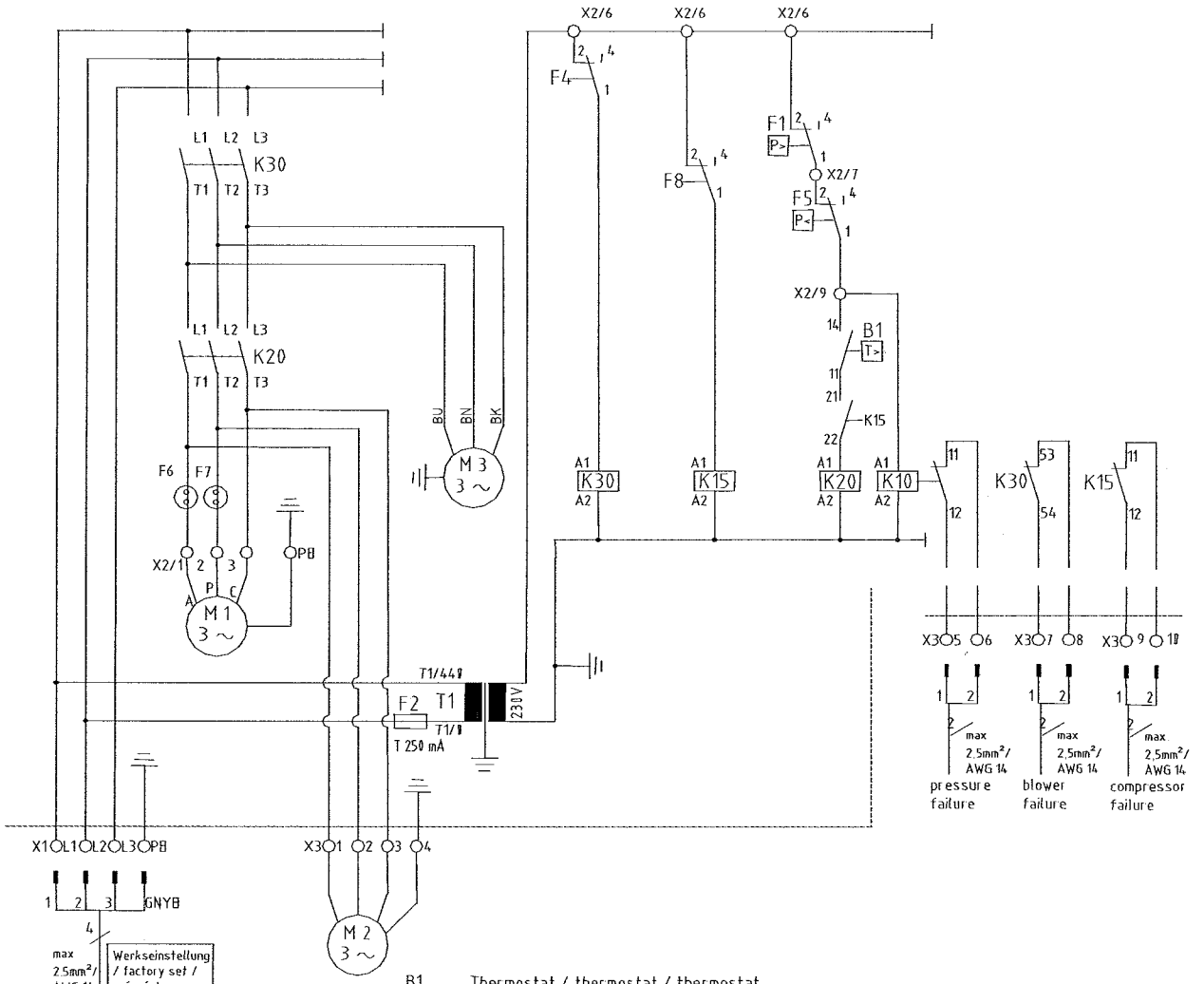
Problem	Possible Cause(s)	Solution
Unit not cooling	No Power	Check Power Source and Electrical Connections
	Loss of Refrigerant	Locate and repair leak
	Evaporator or Condenser Fan not operating	Replace motor, Capacitor or entire Assembly
	Filter clogged	Clean or replace Filter
	Dirty Evaporator or Condenser	Clean Device
	Thermostat improperly set	Lower setting until unit starts
	Thermostat defective	Replace Thermostat or Relay
	Failed Compressor	Replaced Compressor
Ice on Evaporator Coil	Insufficient Heat Load or Unit Oversized for Application	Contact Pfannenberg Inc.
	Failed Evaporator Fan	Replace Evaporator Fan Motor or Assembly
	Dirty Evaporator	Clean Device
Condensate draining continuously	Enclosure not properly sealed	Check and seal all openings
	Excessive opening of Enclosure	Eliminate the frequency of door opening
	Thermostat improperly set	Setting on 35°C / 95°F
Condensate fails to drain off	Malfunction on condensate overflow	Clean overflow and/or check that hose is connected without kinks
Excessive vibration	Defective Fan	Replace Fan
	Compressor Loose	Tighten Mounting Bolts
Compressor Inoperative	Low line Voltage	Check Nameplate Voltage
	Loss of Compressor Oil	Replace Compressor
	Loss of Refrigerant	Locate and repair leak
	Failed Compressor Capacitor	Replace Capacitor
	Thermal Overload	Contact Pfannenberg Inc.
	Power interruptions	Allow Compressor time to reset
Refrigerant or Oil leaks	Crack or pin hole in tubing or brazed joints	Replace tubing or rebraze joint

Technical Data - Series DTS 12000

Model	DTS 12000
Cooling data	
Rated capacity at ambient 35°C (95°F) / internal 35°C (95°F) *	3250 W
Refrigerant type *	R 134a
Refrigerant charge *	840 g / 29,6 oz
Adjustable safty thermostat setting 1 TAS (factory set)	+29.5°C/+85°F
Permissible min./max. ambient air temperature	+8°C (+46°F) to +52°C (+125°F)
Air volume unrestricted, external circulation	fan supplied externally
Air volume unrestricted, internal circulation	690 m³/h / 406 cfm
Condensate discharge	after evaporation direct via tube
Noise level (1m / 3.29 ft distance)	≤ 65dB(A)
Electrical data	
Rated voltage *	460 V
Mains frequency *	60 Hz
Operating range (IEC 60038)	3x380 –420 V 50 Hz/ 3x 414 – 499 V 60 Hz
Power consumption *	1833 VA
Nominal current *	3 A
Starting current *	13 A
Line cord	Terminals
EMI/RFI suppression	CE
Dimensions (incl. roof plate)	
Height	1680 mm / 66.14 inch
Width	482.6 mm / 19.00 inch
Depth	323.85 mm / 12.75 inch
Weight	64 kg / 140 lb
Unit orientation for installation and storage	vertical
Exterior case construction	galvanized sheet steel and stainless steel
Protection classification	NEMA 4/4X if properly mounted to enclosure

* ID Plate Information

Circuit Diagram



Netzkabel
power cable
câble de secteur
3/PE
3x380V-420V 50Hz
3x414V-499V 60Hz
Sicherung / fuse / fusible T16A

Drehfeld "rechts
rotary field "right"
rotation "à droite"

B1	Thermostat / thermostat / thermostat
F1	Hochdruckpressostat / high pressure stat / pressostat haute pression
F2	Sicherung / fuse / fusible
F4	Thermischer Motorschutz für M3-Lüfter
F5	Niederdruckpressostat/ low pressure pressostat/ Forte pression pressostat
F6/F7	Motorschutz-Verdichter/ motor protection compressor/ protection de compreseur
F8	Thermoschutz Verdichter/thermal motor protection compressor/ thermique protection du compresseur
K10	Relais Störmeldung / Relay fault signal/ Relais signalement d un incident
K15	Relais Thermoschutz Verdichter/ Relay thermal motor protection compressor / Relais thermique protection du compresseur
K20	Schütz Verdichter / contactor compressor / contacteur du compresseur
K30	Netzschütz/ power contactor / secteur contacteur
M1	Verdichter / compressor / compresseur
M2	Verflüssiger- Ventilator / condenser fan / ventilateur du condenseur
M3	Verdampfer- Ventilator / evaporator fan / ventilateur de l'évaporateur
T1	Steuertransformator / control transformer / transformateur de contrôle
X1-X3	Klemmleiste / terminal board / bornier de raccordement

Schaltschrank-Kühlgerät/cooling unit/climatiseur

Expo Technologies

Installation, Operation and Maintenance Manual for Expo Technologies
Leakage Compensation (LC) and
Continuous Flow with High Purge (Model CFHP)
Manifolded logic Pressurizing Systems for Class I
conforming to
NFPA 496 2003 edition

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IMPORTANT NOTE

It is essential, to ensure conformity with the standard, that the user of the Expo Technologies observe the following instructions:

Please refer to the standard for detailed requirements and definitions.

References to clauses in the standard are in italics

Contents:

Section 0 Description and principle of operation
Section 1 Installation of the system
Section 2 Operation of the system
Section 3 Maintenance of the system
Section 4 Fault Finding
Section 5 Annex (if applicable)

Section 0 Description and principle of operation

All Expo Technologies pressurization systems provide

a) a method of pressurizing a Pressurized Enclosure (PE) while at the same time compensating for any leakage, together with

b) a method of Purging the enclosure before power is turned on to remove any flammable gas that may have entered the enclosure while it was unpressurized.

All systems have the following two major items:

- A **Control Unit (CU)** containing as a minimum, for "Y" and "Z" Pressurization, a Flow Control Valve (FCV), Minimum Pressure and Purge Flow sensing devices, a "Pressurized"/"Alarm" indicator and an output signal showing whether the PE pressure is satisfactory or not.

Type "X" Pressurization Control Units, in addition, have a fully automatic Purging controller with a Purge timer and electrical power switch interlock.

- A **Relief Valve (RLV)** fitted to the Pressurized Enclosure (PE) to provide a means of limiting the maximum pressure experienced by the PE during operation. The RLV model number has a suffix giving the diameter of the valve aperture (in millimetres) e.g. RLV - - /cs (Carbon Steel) or /ss (Stainless Steel). All RLV's incorporate a metal foam Spark Arrestor to prevent sparks being ejected from the PE through the RLV aperture. The Relief Valve design is patented.

CFHP systems with a Continuous Flow of air after purging have a calibrated Outlet Orifice which can be either be within the Relief Valve (suffix ..cf) or a separate item type SA** or SAU**.

Model LC and CFHP Expo Technologies systems are covered by this manual They are described on the following paragraphs.

0.1 "Leakage Compensation" systems, Model LC

A Leakage Compensation system, Model LC, is intended to have minimal flow after the initial purge time. The Pressurised Enclosure (PE) is built as leak tight as possible and the LC system merely tops up for any enclosure leakage. The system provides an initial high flow of purging air which leaves the PE through the Relief Valve. After the initial purging has been completed the Control Unit changes over to Leakage Compensation mode and the Relief Valve closes. The only flow thereafter is the flow through the "Leakage Compensation Valve" (LCV) which is adjusted so that the flow is just enough to compensate for any leakage from the Pressurized Enclosure (PE). Hence the term "Leakage Compensation". In consequence the system is much more economical to operate than a "Continuous Flow" system.

The Purging Flow rate is monitored by a separate "Purge Flow Sensor" located in the Control Unit which detects the back pressure caused by the purge flow rate through the RLV Spark Arrestor. The Spark Arrestor is calibrated during manufacture so that the back pressure at the desired Purge Flow rate is known. The Purge Flow Sensor is set to operate when that back pressure is exceeded. The output from the Flow Sensor is indicated on the Control Unit and on "X" Pressurization systems, used to operate the automatic purge timer. Both Enclosure Pressure and Purge Flow have to be correct before the Purge Timer can start

0.2 "Continuous Flow after High Purge" Model CFHP system

The CFHP Control Unit is identical to the LC version. The difference is in the provision of one or more fixed outlet orifices to provide a deliberate "leak" at a known flow rate. The Outlet Orifice is pre-calibrated so that the

pressure drop at the desired flow rate is known. The Minimum Pressure Sensor within the Control Unit will be set to the same value as the pressure drop. When the PE pressure exceeds the calibrated pressure the Continuous Flow must be taking place

There are three ways of providing this calibrated Outlet Orifice in current production. Please consult the system specification sheet to determine which has been supplied. The choice:

- Type SAU** where the Outlet Orifice disk is removable and can be easily changed by the user to give different flow rates according to the size of the Pressurized Enclosure and the available air supply capacity. (** denotes the metric thread size of the SAU body)

- Type SA** where the orifice size is fixed and the way to change the flow rate is either to change the setting of the Minimum Pressure Sensor or to replace the SA with one of another size. (** denotes the nominal thread size of the SA body)

- For low flow rates, the Outlet Orifice may be incorporated within the Relief Valve making use of the existing metal foam Spark Arrestor. The Relief Valve will then have a suffix /CF**, where ** is the orifice size in millimetres.

The Leakage Compensation Valve in the CU is opened sufficiently to provide enough air both to compensate for any accidental leakage as well as provide the Continuous Flow through the outlet orifice. In this way a high flow rate is provided during the initial purge period which is thereafter reduced to the desired Continuous Flow rate. Even if the PE had no accidental leakage there would still be a flow from the outlet orifice.

A continuous flow of air can be necessary where the PE has equipment that needs cooling or where there is a possible source of flammable gas inside the PE which needs dilution.

The purge time is based on the initial Purge Flow rate.

If the same flow rate is needed (or is acceptable) both during and after purging a Model CF (Continuous Flow) system is more economical

Section 1 Installation of the system

1.1 Installation of the Expo LC and CFHP Systems

.1 The Expo system should be installed either directly on or close to the Pressurized Enclosure (PE). If not installed on the PE it should be as close as possible. It should be installed so that the system indicators may be readily observed

.2 All parts of any system carry a common serial number. If installing more than one system, ensure that this commonality is maintained on each installation.

.3 Any tubing, conduit and fittings used to connect to the PE should be metallic, or, if non-metallic, conform to the local codes for flammability ratings. No valve may be fitted in any tube connecting the Expo system to the PE.

.4 If the purge exhaust is required to be discharged into a non-classified area the ducting shall conform to:

4.2.2 *Discharge of the protective gas*

.5 The user or manufacturer of the PE shall determine the volume of the PE, the necessary purging volume, and the time to be allowed for purging using the Expo system purging flow rate chosen. It is the user's responsibility to verify or enter this data on the PE and/or Expo system name plate. Ask Expo if in doubt.

Example calculations:

a) If the PE external dimensions give a volume of 20 cubic feet, and the PE is NOT a motor, multiply the volume by four to get the Purging Volume i.e. 80 cubic feet. Divide the Purging Volume by the purge rate e.g. 32 cubic feet per minute, and round up to the next even minute above, i.e. 4 minutes.

b) If the PE is a motor, multiply the internal free volume by ten to get the Purging Volume. In this case the Purging time would be 8 minutes

.6 If the PE contains an internal source of release of flammable gas or vapour, the procedures for assessment of the release as given in Chapter 8 of NFPA 496 shall be observed. The user must verify that the specification of the Expo system e.g. pressures, continuous flow (dilution) rate and type of protective gas are correct for the specific application. If an inert protective gas is required the Expo Control Unit can be specified to have Compressed Air for the control logic and Inert Gas for the protective gas to minimise Inert Gas consumption.

.7 More than one PE can be protected by a single system. If PEs are connected and purged in "series" e.g. "Daisy Chained", the Outlet Orifice must be fitted on the last enclosure with the Purge Inlet to the first enclosure. The bore and length of the tube or conduit used to interconnect the enclosures is critical and will determine the maximum pressure experienced by the first enclosure in the series. Advice on sizing can be obtained from your Expo Technologies, sales office. The test pressure for all the enclosures should be 3 times the pressure inside the first enclosure when purging is taking place.

If PE's are to be connected in parallel each enclosure must have its own outlet Relief Valve, Purge Flow Sensor and Pressure Sensor. System "Models" can be mixed e.g. Model LC for one enclosure and Model CF for another. An example would be a Gas Chromatograph instrument. Expo systems with this facility have option code "TW".

1.2 Quality and installation of the Pressurizing air or inert gas supply

.1 The source of the compressed air must be in a non-classified area. Inert gas may be used as an alternative to compressed air.

2 Unless a supply shut-off valve has been specially fitted within the Expo system, a valve with the same, or larger, thread size as the Control Unit inlet fitting shall be fitted externally and, for "Y" and "Z" Pressurization systems, be provided with a suitable nameplate, see clause:

4-8.2 Enclosures that can be isolated from the gas supply

4-11.4 "Warning-Protective gas supply valve"

3 The tubing and fittings used must conform to 1.1.3 above.

4 The following clauses from NFPA 496:2003 shall be observed:

4.4.1 The quality and contamination of the protective gas

4.4.1.2 Type of protective gas

4.4.2 Piping for the protective gas

4.4.3 Air compressor intake in a non-classified location

4.4.4 Compressor intake line requirements

4.4.5 Compressor power supply requirements

1.3 Provision and installation of Alarm devices

1 Expo Technologies systems have a Minimum Pressure Sensor set to a pressure of at least 0.1" w.c (0.25mb). When the PE pressure is above this set point the Sensor produces a positive "Pressurized" signal. This is displayed on a Red/Green indicator fitted on the Control Unit and can also be used to operate an electrical contact for a remote "Alarm". The pneumatic signal may be supplied either

a) to an electrical pressure operated switch (Option Code /IS) suitable for an Intrinsically Safe circuit in accordance with Expo drawing EP80-2-11, (or for a Non-Incendive circuit in Division 2), or

b) to a bulkhead fitting where it is available to the user (Option Code /PO). It can then be used to operate an external electrical switch either local e.g. explosionproof), or remote in a non-classified area.

When the enclosure pressure falls below the set point of the Sensor the "Pressurized" signal is removed, i.e. the absence of the signal indicates a "Alarm" ("Pressure Failure") condition. The user must make use of this external alarm facility in accordance with NFPA496 2003 requirements if the system "Alarm" indicator is not located in a place where it can be readily observed

Example: The "Pressurized" signal can be used to produce an "Alarm" action by means of a conventional "pressure switch" set to operate at around 15psi (1 bar) The "Pressurized" signal from the Control Unit at 30psi (2 bar) or more will hold the switch in the operated position until the CU detects a low pressure in the Pressurized Enclosure and removes the "Pressurized" signal. The Alarm switch will reset and its contacts can be used to operate a remote electrical alarm.

If the switch is located in the hazardous area it must either be part of an Intrinsically Safe circuit, or be suitably protected e.g. explosionproof The pressure switch should be IS or explosionproof even if it is fitted within the Pressurized Enclosure

Expo Technologies tip: Exception: For a "Z Purge" system fitted in a Division 2 area a non-classified switch inside the PE can be used to operate a remote Alarm provided its electrical supply comes from within the PE (i.e. NOT PROVIDING DRY CONTACTS). When the PE is in use the Alarm can operate normally in response to the pneumatic signal from the CU with option /PO. When the PE power is switched off there is no need for an alarm! Ask for the circuit diagram.

The Alarm switch can also be located in a nearby non-classified location. To get the best response time the switch should be as close as possible to the CU and the maximum length of tubing between the CU and the Alarm switch should not exceed 150 feet (30m) unless "Quick Exhaust Valves" are used (please ask for help) See clauses:

4.10.1 Cut off the power automatically

See also *Exception:*

For "Y" and "Z" Pressurizing systems:

4.3.2 Protective gas supply failure alarm required

4.8.3 If an alarm is used

4.8.4 If an indicator is used

2 No valves may be fitted between the Expo system and the alarm switch.

1.4 Power supplies and their isolation

1 All power entering the PE shall be provided with a means of isolation. This requirement also applies to any external power sources which are connected to "dry contacts" or "volt-free contacts" within the PE.

Exception: Power to Intrinsically Safe, or other apparatus which is already suitable for the location need not be isolated by the Expo Technologies system.

Expo Technologies Tip: It is much better to fit dry or volt-free contacts in the non-classified area or inside an explosionproof box rather than inside the PE. Please ask Expo about "MiniPurge Interface Units" (MIU).

In the case of "X" Pressurization, the isolation of the power must be controlled by the Expo system using the "Purge Complete" pneumatic signal to operate a "Power Switch" in a similar manner to that described in 1.3.1 above.

In the case of "Y" or "Z" Pressurization the power may be controlled manually by the user by the use of local isolating switch.

2 The electrical installation shall conform to the local codes and the following clauses from NFPA496 2003

4.4.6 Power supplies for "double pressurized" installations

4.10.1 Power Cutoff Switch to de-energize all circuits not approved for Division 1 on failure of the protective gas supply.

Exception: The power may remain connected for a short period if immediate cutoff could result in a more hazardous condition and if audible and visual alarms are provided in a constantly attended location.

.3 Many Expo Mini-X-Purge and Super-Mini-X-Purge systems can be retrofitted in the field by the user to have an "Alarm Only" action on pressure or flow failure. It is then the responsibility of the user to de-energize the protected equipment as soon as possible.

.4 The Power (cutoff) Switch must be approved for the location or located in a non-classified area.

.5 No valves are permitted between the Power switch and the Expo system.

.6 For "X" Pressurization, the PE door shall have fasteners that can be opened only by the use of a tool or key. Otherwise the following clauses from NFPA 496 2003 apply:

5.5.2 Door switch interlock

5.5.2.1 Approved for Division 1

Note: The door switch provided with the Expo system (when requested) is pneumatic or electric.

1.5 Marking

.1 The Expo system carries a nameplate giving specification data such as serial and models numbers, Pressure Sensor settings, flow rates and purge time. The same data is also given in the specification sheet accompanying the system.

.2 Other marking required by the standard includes:

4.11.1 Pressurized Enclosure

*"**WARNING - PRESSURIZED ENCLOSURE***
This enclosure shall not be opened unless the area is known to be free of flammable materials or unless all devices within have been de-energized"

5.3.1 Start-up Markings
"Power shall not be restored after the enclosure has been opened until the enclosure has been purged for___minutes at a flow rate of___ "

Expo note: It is understood that Clause 4.11.1 requires the de-energization of all devices that are not suitable for the hazard e.g. devices that are not Explosionproof or Intrinsically Safe. An explosionproof anti-condensation heater for example would not have to be de-energized.

.3 If Inert Gas is used as the Protective Gas and a risk of asphyxiation exists, a suitable warning plate should be fitted to the PE.

Section 2 Operation of the system

2.1 Initial Commissioning

.1 Check that the system has been installed in accordance with Section 1 of this manual.

.2 Disconnect the supply pipe from the inlet to the Control Unit and blow air through for at least 5 seconds per foot of length (15sec/metre) to remove any debris, oil and condensation.

.3 Connect a temporary pressure gauge or liquid manometer to the PE or Control Unit "Pressure Test Point", [on the L.P. Sensor, by the removal of the Red plug - 5/32" (4mm) OD nylon tube].

2.2 Commissioning Leakage Compensation (LC) and Continuous Flow High Purge (CFHP) "X" Purge systems.

(see 2.6 for LC and CFHP "Y" and "Z" Purge systems) On LC and CFHP "X" Purge systems proceed as follows:

.1 Open the Leakage Compensation Valve (LCV) to about 50% of its travel.

.2 Open the supply shutoff valve SLOWLY and allow the PE pressure to rise until the Relief Valve (RLV) opens. Check that the RLV opens at or below the figure specified in the documentation. Repeat the test several times.

.3 Open the supply shutoff valve fully and the purging flow will start.

.4 Check that the internal logic gauge reads 30psi (2bar). If not, adjust the logic pressure regulator to suit (lift the red ring to unlock the knob first)

.5 At this time the "Pressurized" indicator should be Green and the "Purging" indicator should be Yellow. If the yellow indicator remains black the flow through the Relief Valve is below the minimum for which the Flow Sensor has been calibrated. Check the air supply pressure **at the inlet to the Control Unit while purging is taking place**. It must be above the minimum specified. The larger Super-Mini-X-Purge system has a built-in gauge on the filter for this purpose.

.6 On LC and CFHP "X" purge systems the purge timer will start as soon as the "Purging" indicator turns Yellow. Check that the time delay between the indicator turning yellow and the application of power to the PE is not less than the minimum time required to purge the PE. Times in excess of the minimum are permitted and a tolerance of +25% is normally acceptable. If the time is too short it must be adjusted accordingly. Two types of Purge Timer control are currently in production:

a) The original system has a single timer reservoir and a black rotary timer control where the OUTER BODY of the timer restrictor is turned counter-clockwise to increase the time setting. (DO NOT adjust the central screw!) The setting is quite sensitive (logarithmic) and only small adjustments (e.g. one scale division) should made between repeated timing checks unless the time is much too short. As a guide the following table can be used for Mini and Sub-Mini-X-Purge systems. (Multiply by 3 for Super-Mini)

Scale No:	2	3	4	5	6	7	8
Minutes:	0.8	1.5	2	3.5	6	12	20

b) The alternative system uses a pneumatic incremental timer which is adjusted by fully opening or closing one or more of five screwdriver-operated valves, arranged in a block on the control logic manifold – see GA Drawing The opening of each valve incrementally provides a fixed number of minutes of purging time as in the following table

Valve:	1	2	3	4	5
Minutes:	2	4	8	8	16

Thus for a 12 minute purge time, valves 2 and 3 would be open and the others closed. For twenty-four minutes, 4 and 5 would be open and the others closed. **At least one valve must always be open and the screws must be at the appropriate limit of travel.**

.7 After the power has been turned on by the Control Unit, the Purging Valve will close and the air flow into the enclosure will be controlled by the Leakage Compensation Valve (LCV). The initial setting of 50% open may be too high or too low. It should now be adjusted to set the PE pressure and leakage.

There are three possible situations:

a) Air continues to come out through the RLV Spark Arrestor after power has been turned on in considerable quantity The LCV is too far open and the air flow is holding the RLV open continuously. (Note: Some CFHP systems have a deliberate but modest "Continuous" air flow through the RLV in normal operation; do not confuse this flow rate with that caused by excessive setting of the LCV.) Close the LCV slowly observing the manometer or gauge (see item 2.3 above). The PE pressure will start to fall as the flow decreases but eventually the RLV will close and the pressure rise again. At this point the Relief Valve may start to open intermittently as the PE pressure rises to the point where the RLV recloses and the enclosure pressure starts to rise again. This is entirely normal for this type of RLV. Proceed now to b) below:

b) If the Relief Valve is opening intermittently the LCV is slightly too far open. Observe the manometer or gauge When the RLV opens the enclosure pressure falls quickly to the point where the RLV recloses and the enclosure pressure starts to rise again. This is entirely normal for this type of RLV and shows that it is working correctly.

Then continue to close the LCV until the cycling stops and the enclosure pressure starts to fall. Carefully adjust the LCV until the PE pressure is approximately 50% of the RLV opening pressure and stable. This pressure may be around 2"wc (5mb) and will be the "normal working pressure".

We recommend that the setting of the Minimum Pressure Sensor is checked at this time. Note the position of the LCV knob. (A pencil mark placed on the knob at "12 o'clock" can be used). Slowly lower the PE pressure by closing the LCV further counting the number of turns from the "normal working pressure" position. Note the pressure at which the "Pressurized" indicator turns Red and check that it is not lower than the figure given in the documentation. Check also the "Alarm" electrical contacts (if fitted).

As soon as the "Pressurized" indicator turns Red, the enclosure power will be switched off (see also .8 below) and the system will start to repurge

While it is re-purging return the LCV to its "Normal Working pressure" position so that, at the end of purging the enclosure pressure should immediately settle down at the correct "normal" pressure. Finally re-adjust the LCV if necessary.

c) If, at the end of purging, the PE pressure falls below the Minimum Pressure Sensor setting the LCV is not open far enough. The system will start to purge again. While it is purging open the LCV fully and check the enclosure for leakage. This time, at the end of purging, the enclosure should stay pressurized and the Relief Valve action be as in a) or b) above. It is likely that there is significant leakage from the enclosure and attempts to reduce the leakage will be time well spent.

CFHP systems are intended to have a Continuous Flow through the enclosure. The Continuous Flow may emerge through the RLV, in which case the RLV will have a "CF" in its model number Other CFHP systems will have a separate Outlet Orifice/Spark Arrestor and air can be felt emerging through this aperture whenever the enclosure is pressurized

.8 Some "X" Purge LC and CFHP systems can have the "Action on Pressure Failure" (normally "Alarm and Trip") adjusted by the user to become "Alarm Only" in accordance with NFPA496 Clause 4.10.1, exception; please contact your Expo Technologies, Sales office for further details.

2.3 Commissioning Leakage Compensation (LC) and Continuous Flow/High Purge (CFHP) "Y" and "Z" systems.

On LC and CFHP "Y" and "Z" Purge systems, proceed as follows:

.1 Open the supply shutoff valve.

.2 Adjust the Leakage Compensation Valve (LCV) so that the enclosure pressure rises to the point where the "Pressurized" indicator turns green.

.3 Continue to raise the PE pressure until the Relief Valve (RLV) opens. Check that the RLV opens at or below the figure specified in the documentation. Repeat the test several times.

.4 Lower the PE pressure until the "Pressuized" indicator turns Red. Check that the indicator turns Red at or above the pressure specified in the documentation. Check the external alarm contacts (if fitted).

.5 Open the LCV again and set the PE pressure to a level around 50% of the RLV operating pressures. This "working" pressure is not critical. The "Pressurized" indicator should be Green.

.6 Turn the Purge Control Valve "On". This will start the High Purge Flow and the "Purging" indicator should turn

Yellow If the "Purging" indicator remains Black the flow through the outlet valve is below the minimum for which the Flow Sensor has been calibrated. Check the air supply pressure at the inlet to the Control Unit while purging is taking place. It must be above the minimum specified. (Super-Mini-Purge systems have a built-in gauge on the filter for this purpose) If the supply pressure is correct and the "Purging" indicator does not turn Yellow, there is too much leakage from the Pressurized Enclosure. Find and fix the leaks!

"Purging" does not start until the indicator turns Yellow

7 On LC and CFHP "Z" Purge systems the purge timing function is performed by the user. When the "Purging" indicator turns Yellow the Purge Flow is above the minimum required and the purge time can start The user must ensure that the time delay between the indicator turning Yellow and the application of power to the PE is not less than the minimum time required to purge the PE as shown on the PE or Expo system nameplate.

Never turn on the power without purging first unless you have proved that the interior of the PE is gas free and checked that the "Pressurized" indicator is green!

8 After the purge time is completed the Purging Valve should be turned "Off". The High Purge Flow will cease and the air flow into the enclosure will then be controlled once again by the Leakage Compensation Valve (LCV), it should now be re-adjusted if necessary. The RLV should be closed and the enclosure pressure around 50% of the RLV opening pressure. If this is not so there are three possible situations:

a) Air continues to come out through the Spark Arrestor, after High Purge has been turned "Off", in considerable quantity. The LCV is too far open and the air flow is holding the RLV open continuously. (Note: Some CFHP systems have a deliberate but modest "Continuous" air flow through the RLV in normal operation; do not confuse this flow rate with that caused by the excessive opening of the LCV.) Close the LCV slowly observing the manometer or gauge (see item 2.3 above). The PE pressure will start to fall as the flow decreases but eventually the RLV will close and the pressure rise again. At this point the Relief Valve will start to open intermittently as the PE pressure rises to the point where it exceeds the RLV opening pressure when the RLV opens the pressure will fall quickly to the point where the RLV recloses and the enclosure pressure starts to rise again. This is entirely normal for this type of RLV. Proceed now to b) below:

b) If the Relief Valve is opening intermittently the LCV is slightly too far open. Observe the manometer or gauge When the RLV opens the enclosure pressure falls quickly to the point where the RLV recloses and the enclosure pressure starts to rise again This is entirely normal for this type of RLV and shows that it is working correctly.

Continue to close the LCV until the cycling stops and the enclosure pressure starts to fall Carefully adjust the LCV until the PE pressure is approximately 50% of the RLV opening pressure and stable. This pressure may be around 2"wc (5mb) and will be the "normal working pressure"

c) If, at the end of purging, the PE pressure falls below the Minimum Pressure Sensor setting the LCV is not open far enough. The LCV should be opened until the PE pressure is around the normal working pressure

9 CFHP systems are intended to have a Continuous Flow through the enclosure The Continuous Flow may emerge through the RLV, in which case the RLV will have a "CF" in its model number. Other CFHP systems will have a separate Outlet Orifice/Spark Arrestor and air can be felt emerging through this aperture whenever the enclosure is pressurized.

10 "Y" and "Z" purge systems do not control the enclosure power and it is the responsibility of the user to switch off the power whenever the enclosure pressure falls below the minimum permitted i.e. when the "Pressurized" indicator turns Red.

2.4 Normal operation

1 "X" Purge systems: Turn the air supply valve On or Off to start or stop the system, After this the Pressurizing and Purging sequence is entirely automatic.

2 "Y" and "Z" Purge systems are started and stopped in the same way as "X" purge system but the user must close the Power Switch only after the enclosure has been pressurized and purged sufficiently to ensure that the interior of the enclosure is gas free. The power should be shut off as soon as possible after pressure failure. This is also the user's responsibility.

Section 3 Maintenance of the system

The maintenance recommended for the system consists of the following items, supplemented by any additional local requirements imposed by the authority having jurisdiction.

3.1 Commissioning

The tests to be performed during commissioning are described in Section 2 of this manual. They include checking the opening pressure of the Relief Valve, the setting of the Minimum Pressure Sensor, the "Normal Working Pressure" of the enclosure and, for "X" purge systems, the setting of the purge timer.

3.2 Routine maintenance

1 Expo recommend that the commissioning tests be performed again within six months. In addition the following checks are also recommended at that time:-

- Check the RLV and any other Spark Arrestors. Remove any debris or corrosion, or replace with a spare

- Check the condition of the air supply filter element. Clean or replace it as necessary

2 At least every two years, check the following additional items:-

- The apparatus suitable for the Hazardous location
- There are no unauthorised modifications
- The source of air is uncontaminated
- The interlocks and alarms function correctly
- Approval labels are legible and undamaged
- Adequate spares are carried
- The action on pressure failure is correct

Section 4 Fault Finding – LC and CFHP systems

4.1 General If the system does not behave in the manner described above there is a fault. Some of the more likely faults are dealt with below. If a cure cannot be effected by following the procedure shown below please call Expo (24 hour answering) or your supplier for further assistance.

The system has been designed for ease of fault finding and many of the components fitted are plug-in or sub-base mounted. Check components by substitution only after establishing that such action is necessary. If the system is less than 12 months old, parts under warranty should be returned to Expo Technologies for investigation, with a full report of the fault and the system Serial number.

NOTE: As with any pneumatic system the greatest enemies are water, oil and debris in the air supply. For this reason a dust and water filter should always be fitted. But debris can enter from other sources and it is vital therefore that the procedures described in Section 2 is carried out before using the system for the first time, or following any disconnection of the pipework. Failure to perform this work may cause damage which will not be covered under warranty.

Fault Finding

NOTE: Before making the following checks verify that the main supply pressure is between 60 and 115 psi (4-8bar) at the Control Unit and, for X-Purge systems, the regulated pressure on the logic gauge is 30 psi (2 bar)

4.2 Minimum Pressure alarm is on continuously ("Pressurized" indicator is Red)

Possible cause 1: The Pressurized Enclosure (PE) pressure is too low. Try increasing the setting of the Flow Control Valve (FCV) to raise the pressure in the PE.

Possible cause 2: Enclosure fault?

- Is the ACTUAL PE pressure below the setting of the Minimum Pressure Sensor? Check it with a manometer or gauge.
- Is there debris stuck on the face of the Relief Valve disk, perhaps held there because of the magnetic material?
- Has the PE door been closed and all conduit/cable glands sealed?
- Is the PE leaking too much?
- Has the pressure sensing tube been damaged?

Possible cause 3: System fault?

If checks in (a) above reveal that the PE is correct, the fault probably lies in the Control Unit. The basic operation of the Minimum Pressure Sensor can be checked by unscrewing the 2.4" (60mm) diameter diaphragm and, by using a finger, block the threaded hole in the top of the valve module. The valve should operate and the indicator turn Green. If this works correctly and the enclosure pressure is above the setting of the Minimum Pressure Sensor it is likely that the Pressure Sensor diaphragm needs recalibrating or replacing. (See below)

4.3 Relief Valve open (continuously or intermittently)

Possible cause 1: The PE pressure is too high.

The Leakage Compensation Valve (LCV) is too far open. Adjust the LCV as described in Section 2 above.

Possible cause 2: Debris on the RLV disk allowing air to leak from the valve. Remove the RLV cover and clean the valve disk. The disk and spring may be removed from the RLV without affecting the calibration.

4.4 "Purging" indicator will not turn Yellow during purging

Possible cause 1: Insufficient purging Flow due to inadequate air supply pressure. Check the air supply pressure at the inlet to the CU when flow is taking place. Excessive pressure drop in the supply pipe is a very common cause of this problem. The supply pipe must be at least as big as the CU inlet fitting, i.e. at least ½" NB (12mm).
Super-MiniPurge systems with ¾" or 1" connections must have AT LEAST this internal diameter for supply and outlet tubing. Due to the high flows demanded from these large systems the need for adequate supply tubing is VITAL. If in doubt, or for long distances, install tubing that is at least 50% larger than the inlet size!

Possible cause 2: Excessive Pressurized Enclosure (PE) leakage. Check around the PE when flow is taking place. Any significant leakage must be cured. Has a Leakage Test been done? The total leakage should not exceed 10% of the Purge Flow Sensor setting. Check for leakage down the conduit through unsealed stopping boxes.

Possible cause 3: PE not strong enough. Repeat the PE pressure test. FM recommend that the PE is tested to three times the Relief Valve opening pressure e.g. 12"wc (30mb) for many systems. Has this been done?

Possible cause 4: The tubing from the RLV Flow Sensing point to the Purge Flow Sensor is not air-tight

e.g. fitting nuts not tightened or tube damaged. Check and repair as necessary.

Possible cause 5: The Purge Flow Sensor is not operating correctly or out of calibration. The basic operation of the Purge Flow Sensor can be checked by unscrewing the 2.4" (60mm) diameter diaphragm and by using a finger, block the threaded hole in the top of the valve module The valve should operate and the indicator turn Yellow. If this works correctly and the flow through the Relief Valve is above the minimum required WITH THE RELIEF VALVE COVER FIRMLY SECURED IN PLACE the Sensor diaphragm needs recalibrating or replacing.

4.5 System fails to switch power on after the purge time has elapsed? ("X"-Purge systems only)

Possible cause 1: Is power available? Is the power disconnect closed? Are the fuses or circuit breaker OK?

Possible cause 2: System fault? Timer not timed out?

a) Has the "Purging" indicator been Yellow for the whole of the purge time?

b) Is the logic pressure gauge at 30psi (2bar) ±10%.

c) Check the small indicator on the timer valve. When the timer has timed out it should return out when depressed.

d) Is there pressure at the Power Switch output bulkhead and at the Power Switch itself? Is the Switch set at 15psi (1bar)?

e) Is the pipe to the Power Switch airtight? The signal to the Power Switch bulkhead has a restrictor which limits the permissible leakage from the pipe.

f) Note the timer setting. Reset the timer to the minimum available purging period (see Para. 2.2.6) and check operation on that purge time. If it works OK, increase the time progressively until either it is correct, or the system ceases to time out at all. In the latter case, there is an air leak in the timer circuit. (A leak in the timing circuit can cause the timer not to time out) If possible establish the source of the leak with soapy water and retest the system This will involve removing the chassis from the Control Unit – be sure this is the cause before starting the work. It is VERY unusual!!

Ensure that the timer is returned to its original setting and the purge time checked before putting the system back into service.

Possible cause 3: Faulty Power Switch. Check the operation of the Power Switch It should close above 20psi (1.4 bar).

4.6 Pressure Sensor calibration. If it is decided that the Minimum Pressure Sensor or Purge Flow Sensor needs recalibrating it can either be returned to Expo for this service or it can be done by the user as follows:

Disconnect the pressure sensing pipe from the top of the diaphragm. (It is a "push-in" quick release fitting; firmly push inwards the collar surrounding the pipe where it enters the fitting, and then pull the pipe outwards while maintaining the pressure on the collar). Unscrew the 2.4" (60mm) diameter diaphragm housing from the top of the Sensor. Invert it and note the brass adjusting screw in the centre Turning the screw inwards (clockwise) will lower the setting. It is likely that the screw will be very stiff due to the locking sealant. If the screw cannot be moved the application of gentle heat in the area of the brass screw can often help. DO NOT OVERHEAT!

4.7 Filter cleaning If the filter element needs cleaning the transparent bowl can be unscrewed and removed. The filter element also unscrews and can then be cleaned in soapy water. Do not use solvents on any part of the filter assembly.

Expo Technologies tip: It is sometime easier, if the bowl is very tight, to remove the filter by undoing the fitting that holds the filter into the Control Unit On Sub-Mini-X-Purge systems it may be necessary to remove the Minimum Pressure Sensor diaphragm first.

Section 5 Annex of Options fitted

Refer to the annex of this manual for any options fitted as designated by the model code of the system

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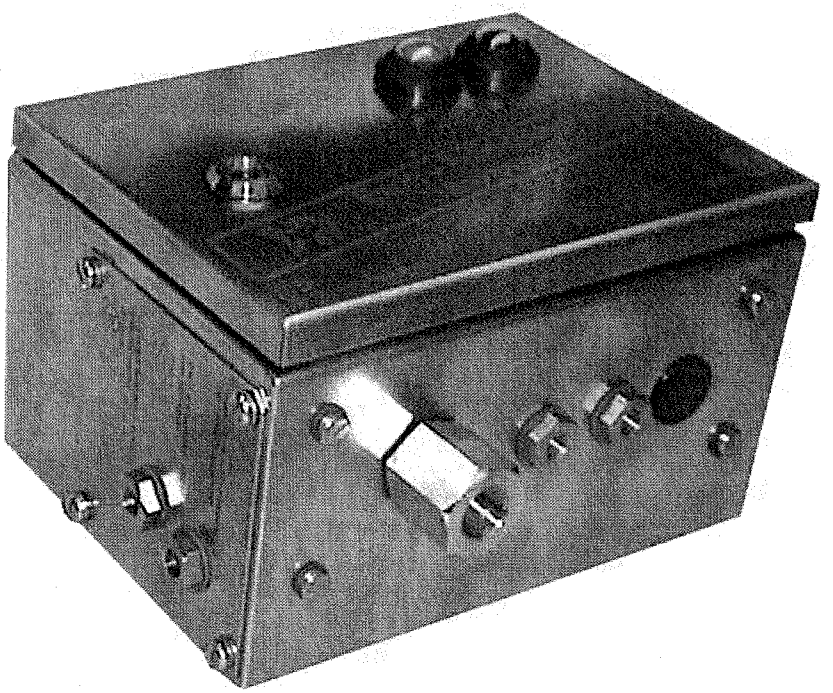
MiniPurge Size 1 Manual
ML 306



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Specification sheet

SPECIFICATION SHEET - Sub Minipurge Systems

Model No. (Example): **00 1XLC / SS / PO / WM** (Note: Not all codes are valid)

Purge System Type
00 = Minipurge

Size
1 = Sub Minipurge

Approval/ Certification
X = Europe EN50016 1995
Sira 01 ATEX1295X

USA / Canada NFPA 496
cUL, E190061. FM, 1X8A4AE
Class I Div 1 Grp A, B, C & D

Australia AS 2380 pt 4
SA WorkCover Ex 3199U
Class I Zone 1 & 2 IIC
Option available on request

Purging Method
CF = Continuous Flow
LC = Leakage Compensation

MiniPurge Housing
SS = 316L Stainless Steel (NROB finish) Neoprene "Top" Mount Gasket
PM = Panel Mount (Side/Front Mount) 316L Stainless Steel (NROB finish)

Options as required
AO = Alarm Only (CF Option only)
MO = Manual Override
MK = MIU MOUNTING KIT (PO systems only)
WM = Wall Mounting Bars

Power & Alarm (Signals)
PO = Pneumatic output
'Power' : On Purge complete = 30 psi / 0.2MPa / 2 bar Signal
'Alarm' : Loss of Pressure = No signal
"Pressurized" = 30 psi / 0.2MPa / 2 bar Signal

PA = Power and Alarm Terminal Box EEx e IIC T6
"Power" : 250 Vac 4 Amp AC14 2PNO - EEx d IIC T6
"Alarm" : 250 Vac 4 Amp AC14 SPCO - EEx d IICT6
(European Systems Only)

IS = Intrinsically Safe, Exi & EEx i circuit
'Power' : used with others' Ex i equipment
'Alarm' : Relay / Barrier

Note: Not all combinations are possible.

Supply Pressure:	Must be regulated at inlet Minimum 60 psi / 0.4MPa / 4 bar Maximum 115 psi / 0.8MPa / 8 bar.		
Air quality:	Compressed air / Nitrogen to instrument quality.		
Ambient Temperature:	-20° to +55°		
Leakage Compensation:	Variable up to 2 scfm / 60 Nl/min to compensate for Leakage of Enclosure		
Purge Timer:	Stepped Adjustable between 1 minute and 30 minutes		
Flow & Pressure Sensors:	**CF:**	One sensor for both "Low Pressure and Flow":	1" WC / 250 Pa (2.5 mbar)
	LC:	"Low Pressure Sensor":	0.2" WC / 50 Pa (0.5 mbar)
		"Flow Sensor":	1.38" WC / 350 Pa (3.5 mbar)

Relief Valve:	**CF**	**LC**
System:		
Model No:	RLV25/ss	RLV25/FS/ss
Opening Pressure:	4" WC / 1 kPa (10 mbar)	4" WC / 1 kPa (10 mbar)
Purge Flow Rate:	N / A (see Spark Arrestor)	8 scfm / 225 Nl/min

Material : 316L Stainless Steel, Spark Arrestor - Nickel-Chrome, Neoprene Gasket

Spark Arrestor Unit (CF systems Only):	Model No:	SAU25
	Purge / Dilution Flow Rate:	Between 0.4 & 8 scfm / 10 & 225 Nl/min. 8 user selectable orifice plates
	Model No:	Stainless Steel

Action on "Loss of Pressure"
CF = Action on "Loss of Pressure" = "Alarm & Trip". /AO on the Model # specifies an "Alarm Only" kit.
LC = Action on "Loss of Pressure" = "Alarm & Trip" or "Alarm Only". LC Model is User adjustable.:

Bulkhead Pipe Fittings:	Air Supply:	1/2" NPT
	Output:	1/2" NPT
	Signal:	1/8" NPT
Visual Indicators:	**CF:**	Alarm/Pressurized (Red/Green) Purge Complete (Red/Green)
	LC:	Alarm/Pressurized (Red/Green) Purge in Progress (Black/Amber)

Figure 1 Specification sheet (DRG Ref:- XBR-7TD0-001)

MiniPurge Size 1

Customer System Specification, Test & Inspection sheet

Customer: Date:
Contact: Quote:
Customer's Ref: Our Job:
Customer's P.O: Dated:
Purge serial number: **M3** Relief Valve serial number: **R3**

Pressurized Enclosure

Approval : SIRA Supplied by:
Classification :
Size HxWxD (mm) : Volume (Litres):
Contents :
Internal Flammable Gas Source : No Door(s): tool or key operated: Yes
Enclosure Pressures: Normal (mb): 4 Max working (mb): 10 Test (mb): 18

Purge Control Unit Data

Model Number : _____

Purge Flow Sensors : Purging Flow OK set at _____ mbarg

Purge Flow rate: : Factory set _____ Nl/min.

: Customer set _____ Nl/min.

Purge Time : Factory set _____ (–0,+20%) Min : sec

: Customer set _____ (–0,+20%) Min : sec

Relief Valve Data

Type/Size : RLV25/.....
Opens at (mb) : 10
Materials : Stainless Steel. Gasket: Neoprene
Mounting method : Direct panel mounting to Expo drawing

Additional Calibrated Outlet Orifice/Spark Arrestor (Continuous Flow systems)

Type/Size : SAU25 (if applicable)
Material : Stainless steel
Thread : Metric M25, (1" clear)
Purge/Dilution Continuous Flow Rate (L/min):

Documentation

Instruction manual ML 306 :
Contents- Installation, maintenance & operating instructions, drawings, certificates.

Test & Inspection Report.

Tested by		Date:	
Inspected by		Date:	

Organisation of this manual

The manual covers the **Size 1 MiniPurge** from the Expo range of MiniPurge systems. The manual starts with the products specification and options. It then describes the various options available and the attributes of each option. Each section of the manual then describes the aspects that are common to all systems and then deals with specific matters relating to the different options.
If a pressurized enclosure and/or MiniPurge Interface Unit (MIU) are supplied under the same order as this MiniPurge system, drawings, specification sheets and certification for these products will be found as individual manuals.

Application Suitability

Purge systems may be used for hazards of certain gas groups, refer to Specification Sheet. Apparatus associated with the Purge system, such as intrinsically safe signalling circuits and flameproof enclosures containing switching devices will be limited in their gas group. The certification documentation supplied with any such devices must be checked to ensure their suitability.

This system is designed for use primarily with compressed air. Where other inert compressed gasses are used (Nitrogen, for example) the user must take suitable precautions so that the build up of the gas does not present a hazard to health. Consult the Control of Substances Hazardous to Health (COSHH) data sheet for the gas used. Where a risk of asphyxiation exists, a warning label must be fitted to the pressurized enclosure.

The following materials are used in the construction of MiniPurge systems. If substances that will adversely affect any of these materials are present in the surrounding environment, please consult Expo for further guidance.

Materials of construction:

Stainless Steel	Nylon
Mild (carbon) Steel	Polyurethane
Brass	Acrylic
Aluminium	Silicone Rubber

This equipment is designed for use under normal industrial conditions of ambient temperature, humidity and vibration. Please consult Expo before installing this equipment in conditions that may cause stresses beyond normal industrial conditions.

The Purge system shall be installed in accordance with relevant standards, such as EN 60 079-14, and any local codes of practice that are in force.

Description and principle of operation
MiniPurge systems are classified according to the four major attributes as shown in this example:

The size or capacity of the system
00 **1**XLC/SS/PO (example part No see Specification Sheet)
1 = Sub MiniPurge

The certification of the system
00 1**X**LC/SS/PO (example part No see Specification Sheet)
X = Europe EN 50016 1995 SIRA Ex 99E1002U Zone 1 & 2 IIC Sira 01ATEX1295X
(Also component Certificate Sira 01ATEX1104U & SCS Cert No.
Ex 94C1052U & Ex99E1002U)

0518 CE II 2 (2) G Ex

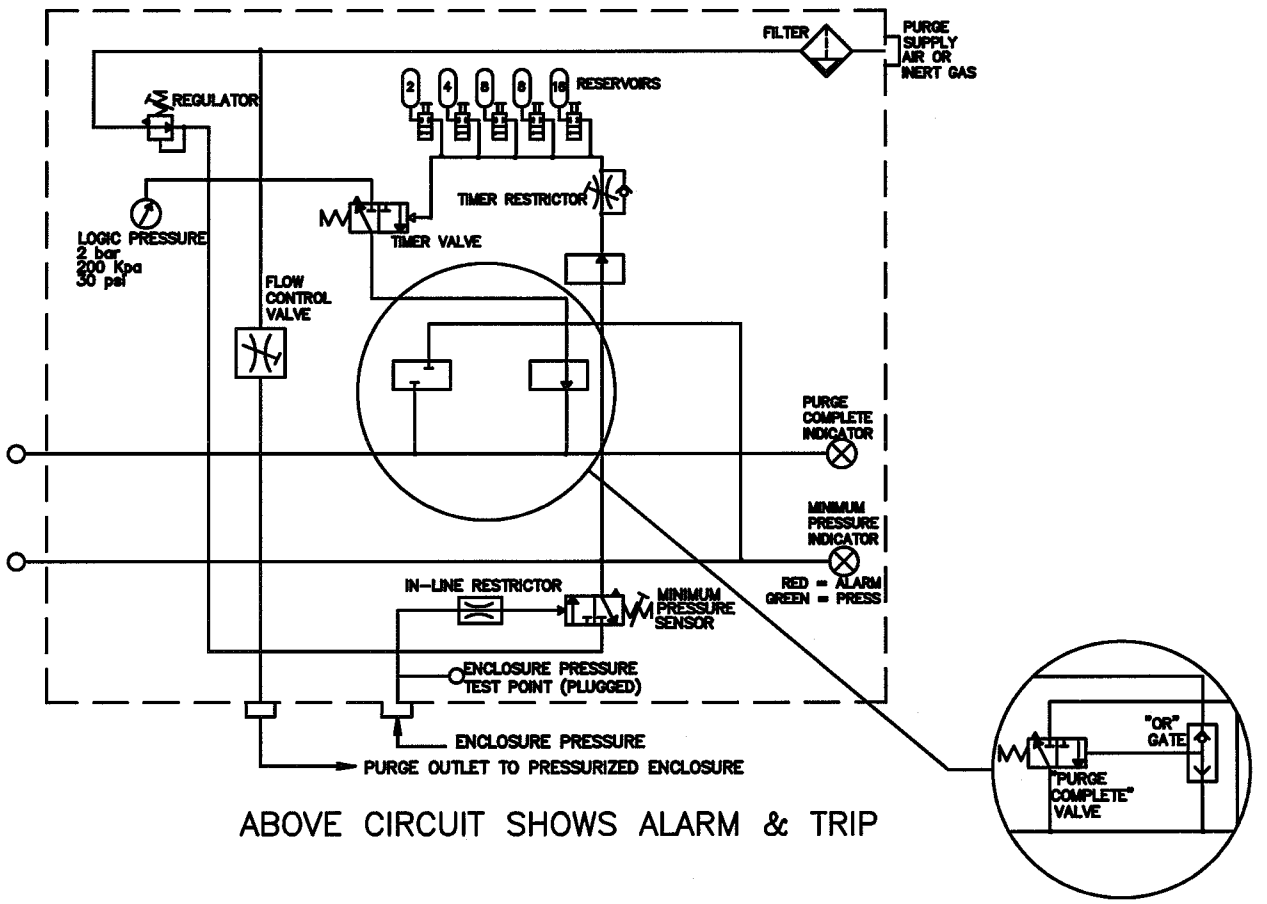
USA / Canada NFPA 496 cULus, E190061. FM, 1X8A4AE Class I Div 1 Group A, B, C & D
Upon request: Australia AS 2380 pt 4 SA Work Cover Ex 3199U Class I Zone 1 & 2 IIC

The method of pressurization
00 1X**LC**/SS/PO (example part No see Specification Sheet)
CF = Continuous Flow
LC = Leakage Compensation

The type of output and indication of the system
00 1XLC/SS/**PO** (example part No see Specification Sheet)
PO = Pneumatic output 'Power': On Purge complete = 30 psi / 0.2MPa / 2 bar Signal 'Alarm': Loss of Pressure = No signal "Pressurized" = 30 psi / 0.2MPa / 2 bar Signal
PA = Power and Alarm Terminal 'J' Box EEx e IIC T6
"Power": 250 Vac 4 Amp AC14 DPNO – EEx d IIC T6
"Alarm" : 250 Vac 4 Amp AC14 SPCO – EEx d IICT6
(European systems only)
IS = Intrinsically Safe, Exi & EEx i circuit 'Power' and 'Alarm': used with others Ex i relay / barrier for power and alarm interface.

Explanation of options & main components
Common Elements
All MiniPurge pressurization systems provide:
A method of pressurizing a Pressurized Enclosure (PE) while at the same time compensating for any leakage.
A method of purging the enclosure before power is applied to remove any flammable gas that may have entered the enclosure while it was unpressurized.
Visual indication of MiniPurge system status.
An output to provide remote indication or control.

The Methods of pressurizing
CF-Continuous Flow



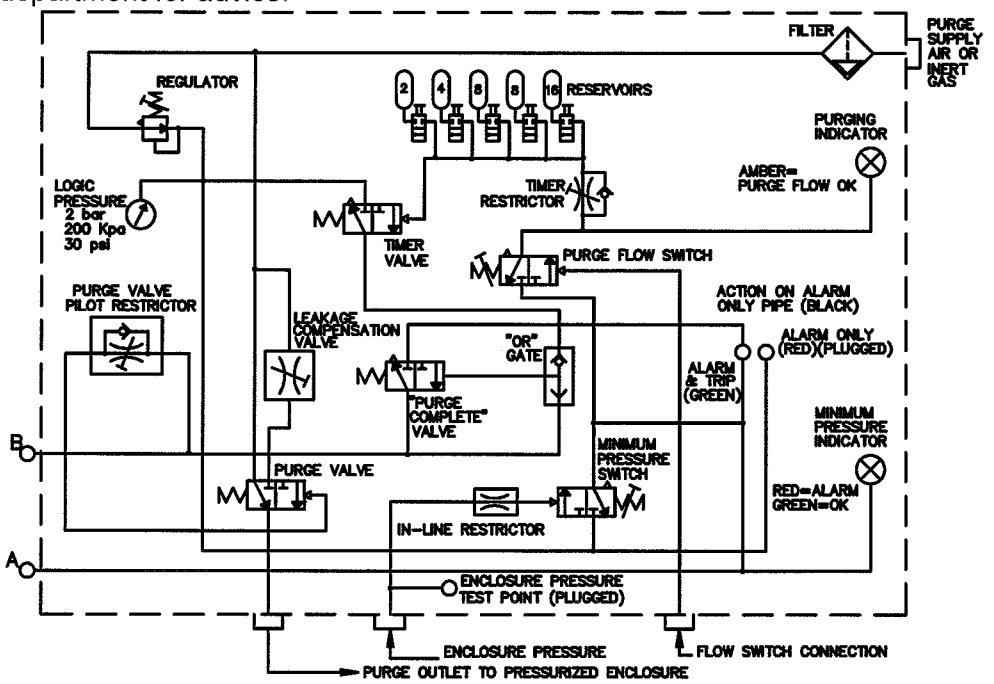
A continuous flow of protective gas is passed through the pressurized enclosure. Initially this flow is verified and performs the purging phase of the operation. When the purging phase is completed – i.e. the purge time has elapsed- the same flow of protective gas maintains the pressurization of the enclosure. This flow may be required to provide cooling of equipment in the pressurized enclosure, or to dilute an internal source of release.

Figure 2 Continuous flow circuit (Drg ref:- XBR-7TD0-006)

LC- Leakage compensation

Initially a high flow of protective gas is passed through the enclosure. This flow is verified and performs the purging phase of the operation. When the purging phase is completed – i.e. the purge time has elapsed - the flow of protective gas is provided via an adjustable valve so that it just compensates for any leakage from the pressurized enclosure in addition to maintaining its pressurization.

If leakage is less than 5 l/min then the leakage compensation valve will be awkward to set. You will find that the Relief Valve spring will cycle open and closed. If this happens contact our service department for advice.



REF DRG: MLA–ZDSP–000

Figure 3 Leakage compensation circuit

Type of output
The functions of the outputs are power control and alarm/pressurized indication. Power control provides a signal to switch the power to the pressurized enclosure. Alarm output provides a passive signal to indicate remotely when the enclosure is not pressurized and an active signal when pressurized.

PO- Pneumatic output
The power control and pressurized outputs are pneumatic signals, which may be used to operate other devices to provide power switching or alarm indication. The lack of any output signal indicates incomplete purge and alarm. In many instances these outputs may be connected to the Expo range of MiniPurge Interface Unit s (MIU).

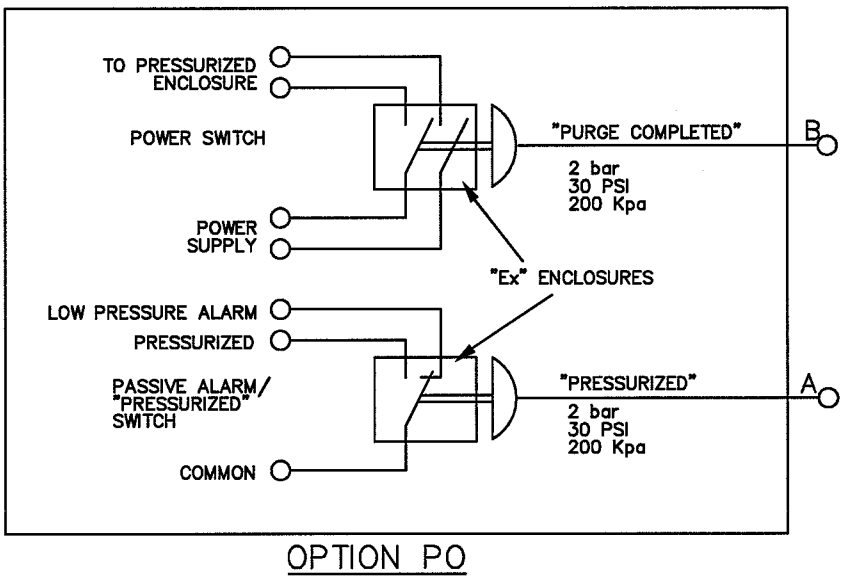


Figure 4 Pneumatic output option (Drg ref:- XBR-7TD0-006)

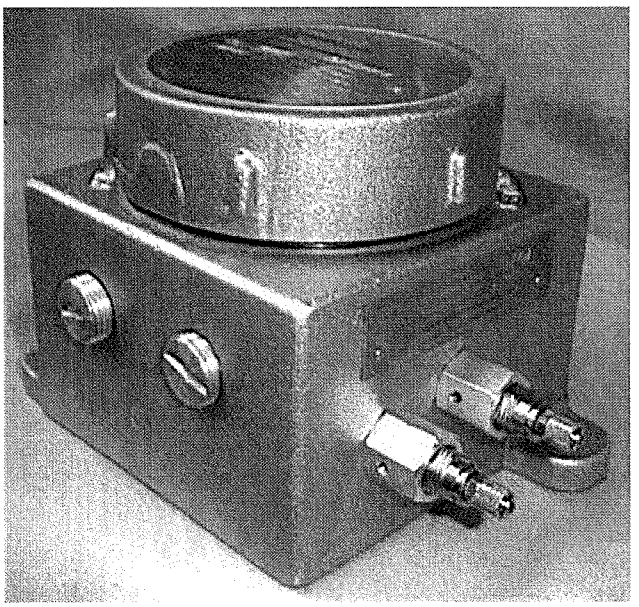


Figure 5 Typical MiniPurge interface unit type (MIU)

IS - Intrinsically safe output

The power control and alarm outputs are volt free contacts which form part of an intrinsically safe circuit which then provides power control or alarm outputs in a safe (unclassified) area. These contacts must only be connected to intrinsically safe circuits as the switch contacts are in the hazardous area. In many instances these outputs may be connected to the Expo range of MiniPurge Interface Units (MIU).

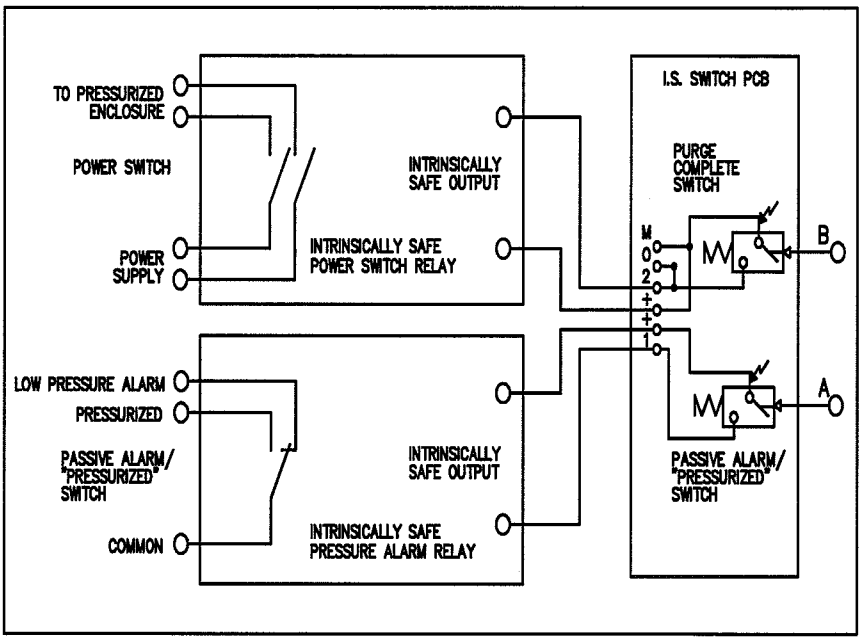


Figure 6 Intrinsically safe option (Drg ref:- XBR-7TD0-006)

PA - Power and Alarm

By integral EEx d flameproof switches, terminated in EEx e junction box in accordance with European standards.

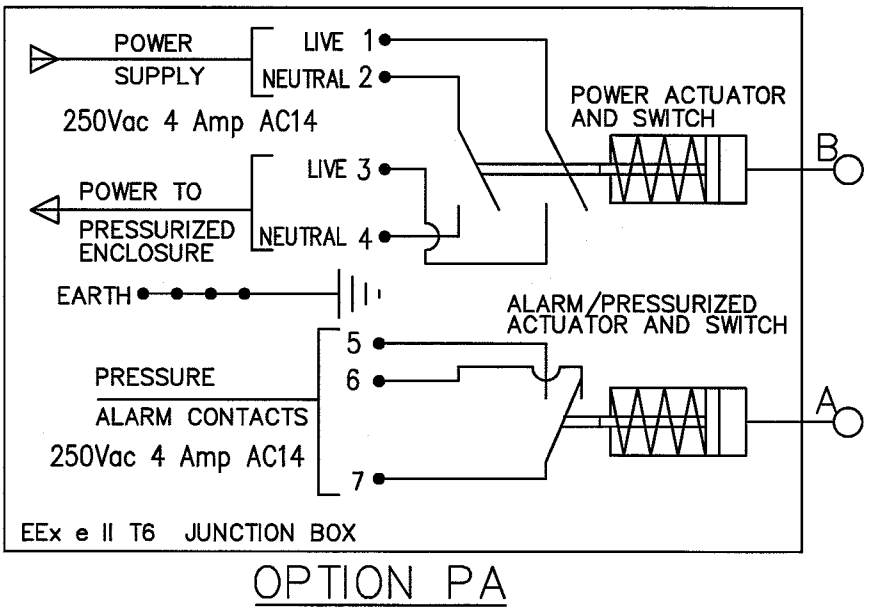


Figure 7 EEx de power and alarm option (Drg ref:- XBR-7TD0-006)

Certification

Expo MiniPurge systems are certified to **ATEX** European standards, **FM** and **cULus** approved to ANSI NFPA 496, North American standard, and also to **SA,** Australian standards. Details of the applicable certification are included in the certification section of this manual.

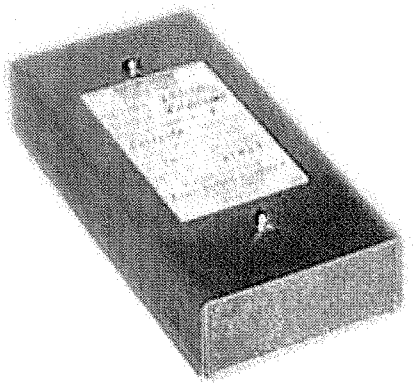
Equipment components

The Expo MiniPurge system comprises of a number of component units. The units required depend on the type of system selected. These are summarised in Table 1. The general description and function of each is as follows:

Control Unit (CU)

The control unit is at the heart of the system. It contains a pneumatic logic circuit specially designed and built to control the functions required for purge and pressurization. For all systems this includes air filtration, pressure and purge flow measurement, purge timing, and local visual indication of pressurized/Alarm and flow sensed. It also provides the outputs for power and remote alarm control corresponding to the output type selected.

Relief Valve (RLV)



The relief valve unit is fitted to the Pressurized Enclosure to provide a means of limiting the maximum pressure experienced by the Pressurized Enclosure during operation. The RLV model number has a suffix giving the diameter of the valve aperture in millimetres e.g. RLV25 (= 25mm bore). It also incorporates a Spark Arrestor to prevent sparks being ejected from the Pressurized Enclosure PE into the classified area. The Relief Valve design is patented.

Figure 8 Relief valve

Calibrated Outlet Orifice/Spark Arrestor (SAU)

To measure the flow through a pressurized enclosure, the differential pressure across a restriction or orifice is measured. In leakage compensation systems the flow measurement is incorporated in the relief valve. The continuous flow systems use the SAU25, which has a range of interchangeable calibrated orifice plates for the purge flow measurement.

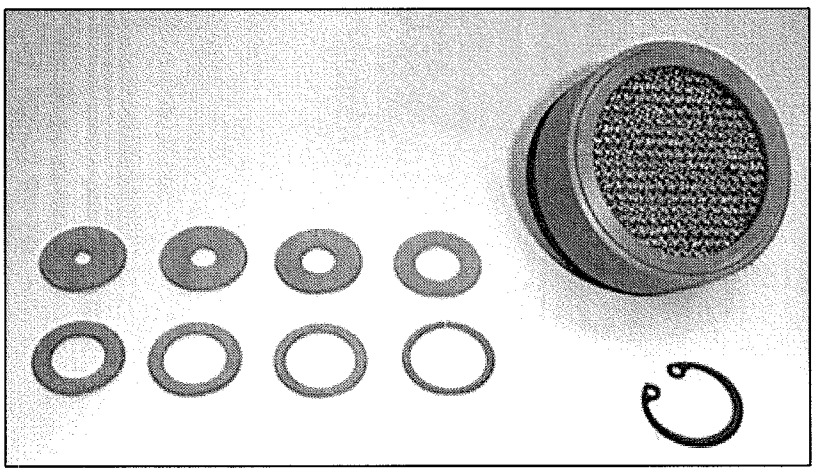


Figure 9 Spark arrestor type SAU25

Installation of the system
There are up to three components for the MiniPurge system, dependant upon the system type.
Table 1 System Components

System type	Control Unit (CU)	Relief Valve (RLV)	Spark Arrestor Unit SAU25
00 **1***/LC/SS/PO Leakage Compensation	YES	YES	Integral to RLV
00 **1***/CF/SS/PO Continuous Flow	YES	YES	YES

* see specification sheet for certification code.

Internal Gas Release
If the pressurized enclosure contains an internal source of release of flammable gas or vapour, the procedures for assessment of the release as given in NFPA 496, IEC79-2 or EN 50016 1996 should be used. Expo is pleased to provide assistance or consultancy and advice on such matters.
The user must verify that the specification of the Expo system e.g. pressure, continuous flow (dilution) rate and type of protective gas are correct for the specific application.

Multiple Enclosures
More than one pressurized enclosure can be protected by a single system. Where pressurized enclosures are connected and purged in "series" e.g. "Daisy Chained", the Relief Valve and when using a continuous flow system, the SAU25 should be fitted on the last enclosure with the Purge Inlet connected to the first enclosure. The bore and length of the pipe or conduit used to interconnect the enclosures is critical and will determine the maximum pressure experienced by the first enclosure in the series. Advice on sizing can be obtained from the Expo sales office but in general terms when using RLV25 or SAU25, the pipe bore size should not be less than 25mm (1"). A common fault of installing small bore pipe leads to over pressurizing of all but the last enclosure. If pressurized enclosures are to be connected in parallel each enclosure must have its own outlet either SAU25 or relief valve and pressure sensor.

Location
The MiniPurge system should be installed either directly on or close to the pressurized enclosure (PE). See mounting details.

Control Unit (CU)
Generally the most convenient arrangement is to install the control unit on the top of the pressurized enclosure. Must be mounted vertically as shown in MiniPurge Configuration XBR-7TD0-003. The control unit can be mounted on the side of the pressurized enclosure using the rear mounting fixings. The piped connections to the pressurized enclosure should be made using metallic tube through suitable bulkhead connections. The control unit can be remote mounted using the wall mounting bars (/WM option), and should be installed as close as possible to the pressurized enclosure. It should be installed so that the system indicators and certification labels may be readily observed.

Relief Valve (RLV) and Spark Arrestor Unit (SAU)
To achieve efficient purging the points where air enters and exits the pressurized enclosure should normally be at opposite ends of the pressurized enclosure. These items must be mounted vertically. The relief valve (RLV) or spark arrestor unit (SAU) is recommended to be situated at the bottom, or on the side of the enclosure at the bottom, when the control unit is top mounted on the enclosure, thus achieving top to bottom purging. The purge air may be piped within the pressurized enclosure to ensure purging of potential dead air spots. The proof of this may only be apparent when a CSA or European purge test is performed.

Connections to protective Gas supply.
The system should be connected to a protective gas supply, which is suitable for purging and pressurization. Generally instrument quality compressed air is used, though other inert gas may be used- e.g. Nitrogen. It is important that the compressed air / inert gas supply is capable of delivering the quantity required for purging and still maintaining sufficient supply pressure. This means ensuring adequate size of pipe and airline accessories. Over 80% of commissioning problems reported to Expo are due to **inadequate sized piping or air supply.** Although MiniPurge units all include a filter, the compressed air / inert gas supply should be from a clean dry source, and should have a dedicated local air pressure regulator. Minimum air supply pressure 4 bar/ 60 psig / 4MPa. The pressure is to be maintained whilst purging at normal purge flow rate.

Purge air from Control Unit to pressurized enclosure.
When the control unit is directly top mounted onto the pressurized enclosure, no connection will normally be necessary, as the purge air will discharge into the pressurized enclosure directly. When the control unit is not top mounted, or where internal air distribution is necessary a connection should be made from the purge air outlet on the control unit (normally ½" NPT Female), via pipe pressure rated at least to the supply pressure, to the pressurized enclosure. This should be kept as short as possible and should be adequately sized to ensure that the full purge flow can be delivered.

Control Unit to enclosure pressure monitor.
When the control unit is directly top mounted onto the pressurized enclosure, no connection will normally be necessary, as the enclosure pressure monitor point will sense directly inside the pressurized enclosure. Only if the control unit is not directly mounted or if there are fans, which may create, localised low-pressure areas within the pressurized enclosure is it necessary to pipe this connection. The connection is made to the enclosure pressure sensor fitting (normally 1/8" NPT Female) on the control unit. There is virtually no flow in this circuit so small bore tube may be used. Expo recommends 6mm (¼") bore metallic tube. However it is important that all connections are free of leaks.

Control unit to flow sensor.
For Continuous Flow (**CF**) systems this function is performed by the enclosure pressure sensor monitor connection. On Leakage Compensation (**LC**) systems this connection is made from the enclosure flow sensor fitting (normally 1/8" NPT Female) on the control unit, to the fitting (normally 1/8" NPT Female) on the relief valve (RLV). Again, Expo recommends 6mm (¼") bore metallic tube.

Power supplies and their isolation
All power entering the pressurized enclosure shall be provided with a means of isolation. This requirement also applies to any external power sources, which are connected to equipment such as "volt-free" or "dry" contacts within the pressurized enclosure. Printer signal, network cards etc need isolation.

Exception: Power to Intrinsically Safe, or other apparatus that is classified for the hazardous area need not be isolated by the Expo system. In all cases the application and the isolation of the power must be controlled by the MiniPurge system. Refer to Specification Sheet for output options available.

Adjustments and settings

The user adjustable settings are as follows:

Purge time
For continuous flow (CF) systems only – purge flow rate orifice size selection
Leakage compensation
Action on pressurization failure

Purge time

If no specific purge test has been performed on the pressurized enclosure, the volume of the pressurized enclosure must be determined by the manufacturer or user of the pressurized enclosure and the necessary purging time calculated based on the purge flow rate specified by the "standard" being used. It is the user's responsibility to verify or enter this data on the pressurized enclosure and/or MiniPurge system nameplate. Ask Expo if in doubt. The European standard EN 50016 (2nd edition) states that a purge test must be completed to verify effective purging. EN50 016 (1st edition) permitted 5 free volume changes and an example of the calculations are as follows:-

If the pressurized enclosure external dimensions indicate an internal free volume of 500 Litres then, $\frac{\text{500 litres enclosure volume x 5 volume changes}}{\text{225 litres/minute purge flow rate}}$ = 12 minutes purge time

If the pressurized enclosure is a motor, experience of purge testing shows that it is prudent to multiply the motor internal "free" volume by ten to get the purging volume.

$\frac{\text{500 litres enclosure volume x 10 volume changes}}{\text{225 litres/minute purge flow rate}}$ = 23 minutes purge time

The following applies for NFPA 496 standards where 4 complete volume changes are permitted for enclosures except when the pressurized enclosure contains a motor when 10 volume changes are required.

If the pressurized enclosure external dimensions indicate a total volume of 8 cubic foot, then,

$\frac{\text{8 cubic foot enclosure volume x 4 volume changes}}{\text{8 cubic foot/minute purge flow rate, (see above)}}$ = 4 minutes purge time

If the same pressurized enclosure contains a motor, then,

$\frac{\text{8 cubic foot enclosure volume x 10 volume changes}}{\text{8 cubic foot/minute purge flow rate, (see above)}}$ = 10 minutes purge time

The standard MiniPurge units have the patented digital pneumatic timer system as shown in *Figure 10 Mini purge timer block*. The purge time is set by opening / closing the pinch valve so that the sum of the open valve times equals or exceeds the required purge time. **At least one valve must always be open, and the screws must be at the appropriate limit of travel. Do not over tighten.**

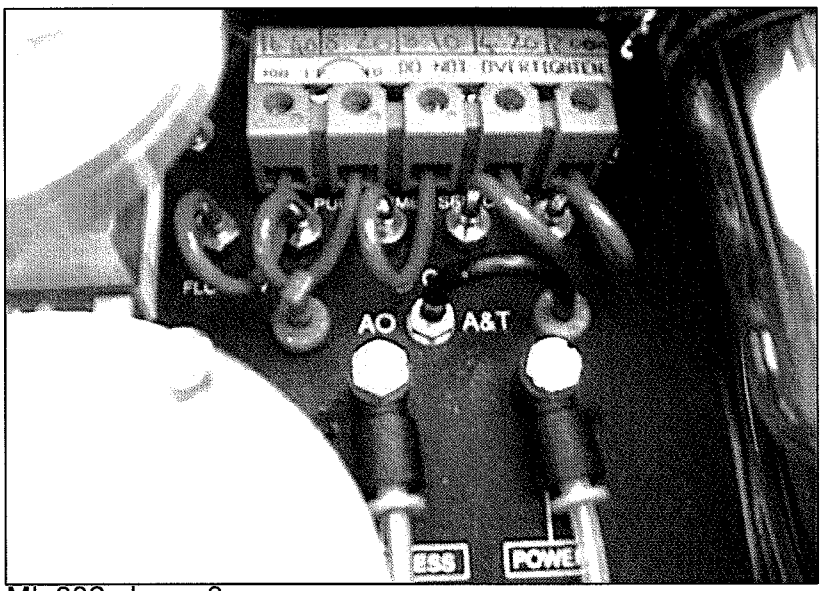


Figure 10 Mini purge timer block

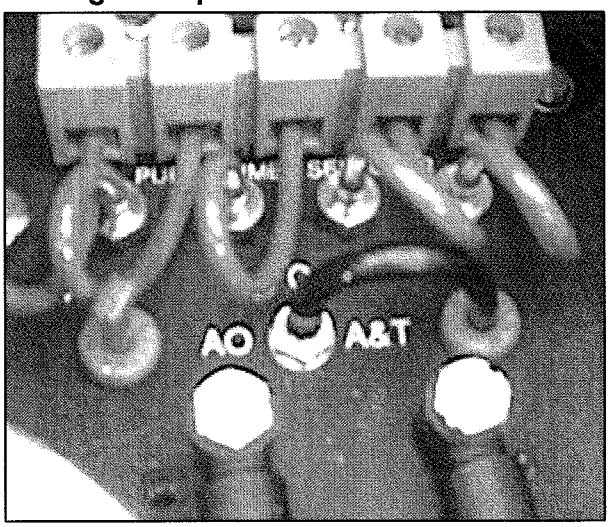
Purge flow rate for CF (continuous flow) systems.
The purge flow rate is selected by placing the appropriate orifice plate in the SAU (spark arrestor unit). The purge flow rates given in the Table 2 below are based on standard setting of the flow sensor of 2.5mbar, 1 in wc, 250Pa. For leakage compensation systems the purge flow rate is set by the selection of the relief valve and is not user adjustable.

Orifice plate number	Continuous flow rate with 2.5 mbarg, 1 in wc, 250 Pa flow sensor set point	
	N litre/minute	SCFM
1	10	0.4
2	25	0.9
3	40	1.4
4	65	2.3
5	90	3.2
6	135	4.8
7	180	6.4
8	225	8.0

Table 2 Purge Flow Rates

Action on loss of pressurization
The action on loss of pressurization is the responsibility of the user.
The action on loss of pressurization can be set to ALARMS ONLY (AO), or ALARM AND AUTOMATIC DISCONNECT OF POWER (A&T).

Leakage Compensation



The action on loss of pressurization is set by moving the jumper tube (see Figure 15 Action on loss of pressurization jumper tube). The standard setting is alarm and trip where the link is from C to A&T, with a plug in AO. Changing to alarm only is user adjustable by moving the link from C to AO, and plugging A&T.

Figure 11 Action on loss of pressurization jumper tube

Continuous Flow
The standard CF system is built set to alarm and trip. Alarm only can be installed when order specified or supplied as a retrofit kit later. See options.

The selection for action on loss of pressurization depends on the area of operation and the following guidelines should be followed.
The user must make use of this alarm facility in accordance with the local code of practice for "action on pressure or flow failure". Most codes include the following recommendations:
Zone 1 Installations:
Alarm and automatic disconnect of power.
Exception: If the equipment inside the pressurized enclosure is suitable for use in Zone 2, the power trip may be performed manually, (no automatic power trip), if the pressure or flow failure persists for an unacceptable time.

Zone 2 Installations:
Alarm only on pressure or flow failure with power being removed manually by turning off the air supply to the MiniPurge system if the failure persists for an unacceptable time.

Class I Division 1 Installations:
Alarm and Automatic Trip of Power. Note: NFPA 496 2-10.1 states power to the circuits shall be permitted to be continued for a short period if immediate loss of power would result in a more hazardous condition and if both audible and visual alarms are provided at a constantly attended location.

Class I Division 2 Installations:
Where automatic timing is preferred, Alarm only on pressure or flow failure with power being removed manually by turning off the air supply to the MiniPurge system if the failure persists for an unacceptable time.

Commissioning

Start by check that the system has been installed in accordance with this manual.
Disconnect the supply pipe from the inlet to the MiniPurge system and blow it through for at least 10 seconds per metre (3ft) of length to remove any debris or condensation.
Connect a temporary pressure gauge or water manometer to the pressurized enclosure or MiniPurge system pressure test point (Remove the red plug on the low pressure sensor and connect 4mm OD nylon tube).

Figure 12. PE or MiniPurge system pressure test point

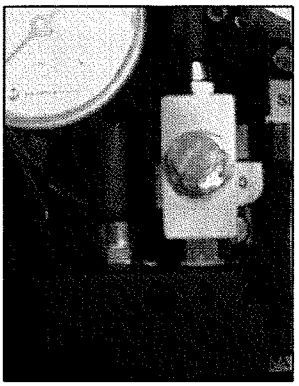
Unless a supply shut-off valve has been specially fitted inside the MiniPurge system, it may be advisable to install an external shutoff valve with the same, or larger, thread size as the MiniPurge control unit inlet fitting upstream of the connection.

Continuous Flow (CF) Systems

Open the flow control valve (FCV) until the alarm/pressurized indicator just turns from red to green. Clockwise will reduce the flow and anti-clockwise will increase the airflow.
If the flow control valve (FCV) is opened fully and the indicator has still not turned green, check the air supply pressure **at the inlet to the control unit while flow is taking place**. It must be above the minimum 4 bar/ 60 psig/ 400Kpa specified.
Figure 13. Flow control valve (FCV) below.

Check that the internal logic gauge reads 2bar /30 psig/200KPa.
The purge timer will start as soon as the 'alarm/pressurized' indicator turns from red (alarm) to green (pressurized). Check that the time delay between the indicator turning green and the application of power to the pressurized enclosure is not less than the minimum time required to purge the pressurized enclosure. When the purge time has been completed, the 'purge complete' indicator will turn from red to green.
After the power has been turned on by the control unit, the air flow will continue at the same rate to provide cooling or dilution as required.

Leakage compensation systems (LC)



Open the leakage compensation valve (LCV) fully, turn anti-clockwise. Clockwise will reduce the flow and anti-clockwise will increase the airflow.
Open the supply regulator SLOWLY and allow the pressurized enclosure pressure to rise until the relief valve (RLV) opens. Check that the RLV opens at or below the figure specified in the documentation.
Note tolerance of ± 2 mbarg / 0.8 in wc / 200Pa.
Repeat the test several times.
Open the supply regulator to between 4 and 8 barg / 60 and 115 psi / 400 and 800 Kpa and the purging flow will start.
Check that the internal logic gauge reads 2bar /30 psi / 200 Kpa

Figure 14 Leakage compensation valve

At this time the "alarm/pressurized" indicator should be green and the "purging" indicator should be yellow. If the yellow indicator remains black the flow through the relief valve is below the minimum for which the flow sensor has been calibrated. Check the air supply pressure at **the inlet to the control unit while purging is taking place**. It must be above the minimum specified.

The purge timer will start as soon as the "purging" indicator turns yellow. Check that the time delay between the "purging" indicator turning yellow and the application of power to the pressurized enclosure is not less than the minimum time required purging the pressurized enclosure. Times in excess of the minimum are permitted and a tolerance of +20% is normally acceptable. If the time is too short it must be increased accordingly.

After the power has been applied via the control unit, the purging valve will close and the air flow into the enclosure will be controlled by the leakage compensation valve (LCV). The initial setting of fully open will normally be too high. It should now be adjusted to set the pressurized enclosure pressure and leakage. There are three possible situations:-

Air continues to come out through the RLV Spark Arrestor after power has been applied in considerable quantity. The LCV is much too far open and the air flow is holding the RLV open continuously.
Close the LCV slowly. The pressurized enclosure pressure will start to fall as the flow decreases but eventually the RLV will close and the enclosure pressure rise again. At this point the Relief Valve may start to open intermittently as the pressurized enclosure pressure rises to the point where it exceeds the RLV opening pressure. When the RLV opens the pressure will fall quickly to the point where the RLV re-closes and the enclosure pressure starts to rise again. This is entirely normal for this type of RLV.

If the Relief Valve is opening intermittently the LCV is slightly too far open. When the RLV opens the enclosure pressure falls quickly to the point where the RLV re-closes and the enclosure pressure starts to rise again. This is entirely normal for this type of RLV and shows that it is working correctly.
Continue then to close the LCV until the cycling stops and the enclosure pressure starts to fall. Carefully adjust the LCV until the pressurized enclosure pressure is approximately 50% of the RLV opening pressure and stable. This pressure may be around 5 mbarg / 2 in wc / 500 Pa and will be the "normal working pressure".

We recommend that the setting of the minimum pressure sensor is checked at this time. Note the position of the LCV knob. (A pencil mark placed on the knob at "12 O'clock" can be used). Slowly lower the pressurized enclosure pressure by closing the LCV further, counting the number of turns from the "normal working pressure" position. Note the pressure at which the "alarm/pressurized" indicator turns from green to red and check that it is not lower than the figure given in the documentation. Check also the "alarm" electrical contacts. As soon as the "alarm/pressurized" indicator turns red, the system will start to re-purge. If alarm and trip function is selected the enclosure power will be switched off.

While it is re-purging return the LCV to its "normal working pressure" position so that, at the end of purging, the enclosure pressure should immediately settle down at the correct "normal" pressure.

If, at the end of purging, the pressurized enclosure pressure falls below the minimum pressure sensor setting and the LCV is fully open, the system will start to purge again. This is indicative of excessive leakage from the enclosure. In this case, check the enclosure for leakage, and reduce or eliminate the leaks. This time, at the end of purging, the enclosure should stay pressurized and the relief valve action is as in a) or b) above. Proceed as described above.

Normal operation

Turn the air supply on or off to start or stop the system. After this the pressurizing and purging sequence is entirely automatic

Maintenance of the system

The maintenance recommended for the system consists of the following items, supplemented by any additional local requirements imposed by the local Code of Practice. Expo recommends that the commissioning tests be repeated at least every six months.

In addition the following checks are also recommended at that time:-

Check the RLV and all Spark Arrestors. Remove all debris & corrosion, or replace with a spare.

Check the condition of the air supply filter element. Clean or replace it as necessary.

At least every two years check the following additional items:-

Apparatus is suitable for the Hazardous location

There are no unauthorized modifications

The air supply must be to the correct quality, refer to section Air Quality.

The interlocks and alarms function correctly

Approval labels are legible and undamaged

Adequate spares are carried

The action on pressure failure is correct

Pressure sensor calibration

If it is decided that the minimum pressure /purge flow sensor needs recalibrating it must be returned to Expo for this service.

Filter cleaning

If the filter element needs cleaning the filter bowl can be unscrewed and removed. The filter element also unscrews and can then be cleaned in soapy water. Do not use solvents on any part of the filter assembly.

Fault Finding

If the system does not behave in the manner described above there is a fault. Some of the more likely faults are dealt with below. If a cure cannot be affected by following the procedure shown below please call Expo (24 hour answering) or your supplier for further assistance.

The system has been designed for ease of fault finding and the many of the components fitted are plug-in or manifold mounted. Check components by substitution only after establishing that such action is necessary. If the system is less than 12 months old, parts under warranty should be returned to Expo for investigation, with a full report of the fault and the system serial number.

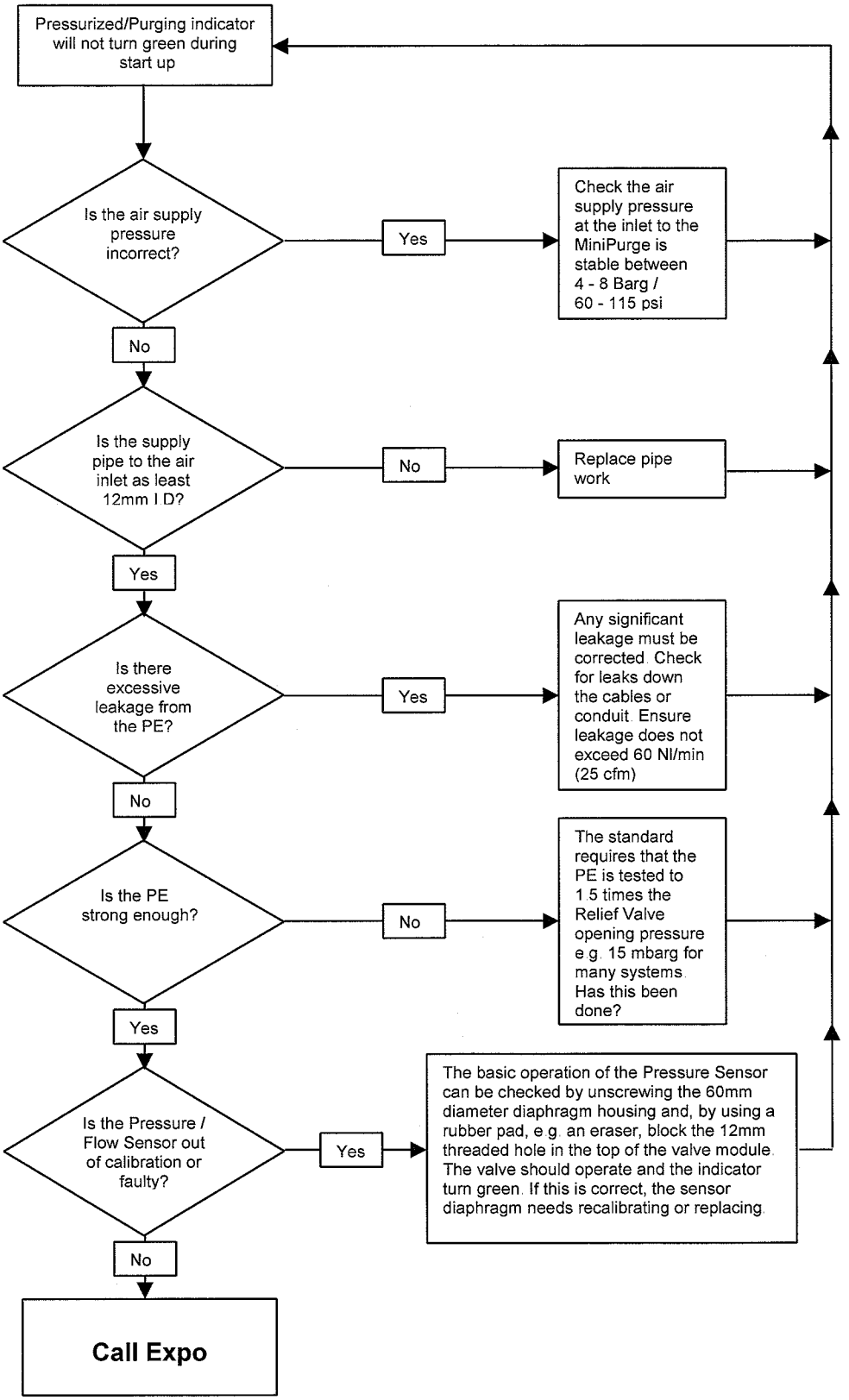
As with any pneumatic system the greatest enemies are water, oil and dirt in the air supply. For this reason the air system must always incorporate a dust and water filter. This can be part of the

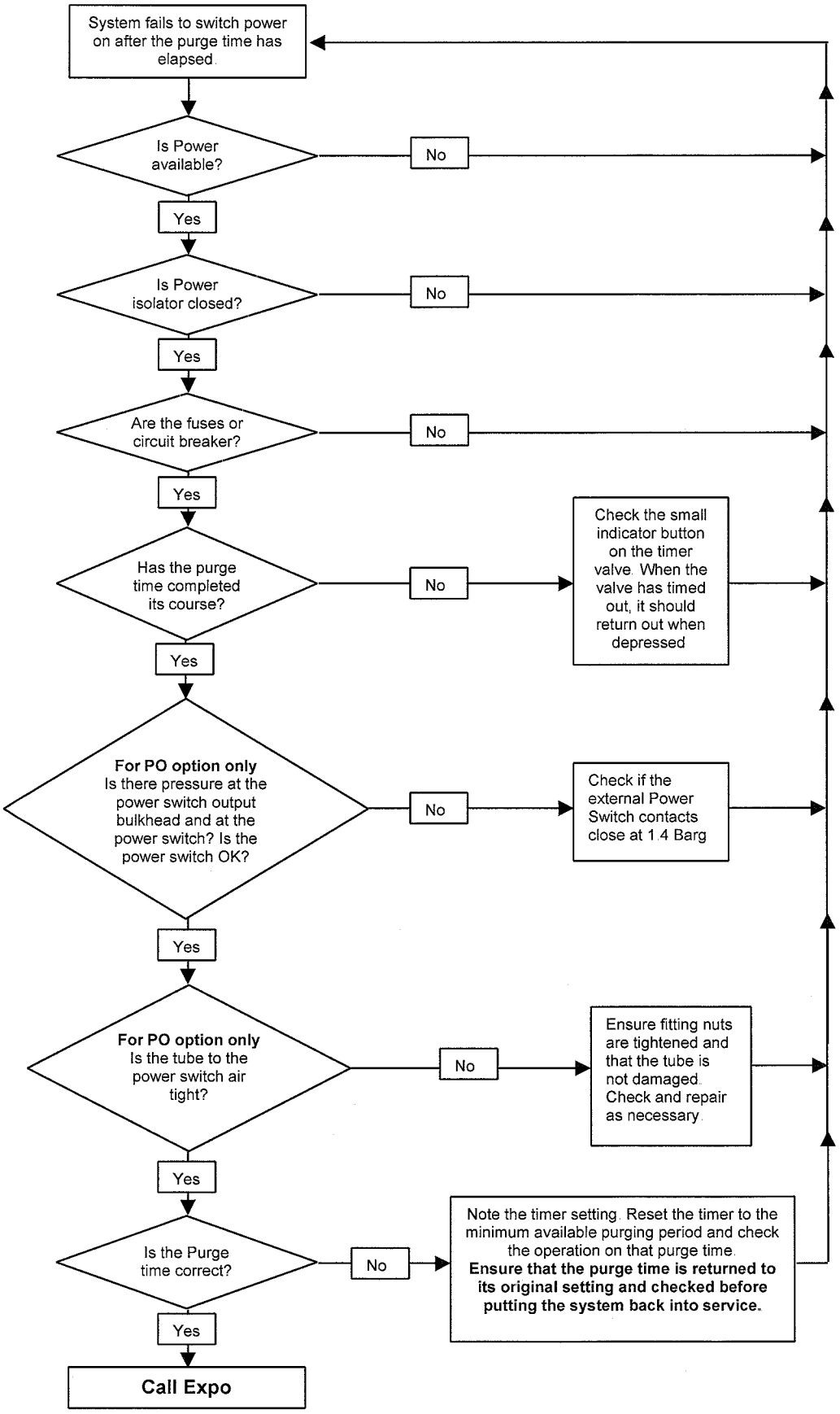
Expo system or can be provided by others. However dirt can enter from other sources and it is vital therefore that the procedures described in Section 2 is carried out before using the system for the first time, or following any disconnection of the pipe-work. Failure to perform this work may cause damage that will not be covered under warranty.

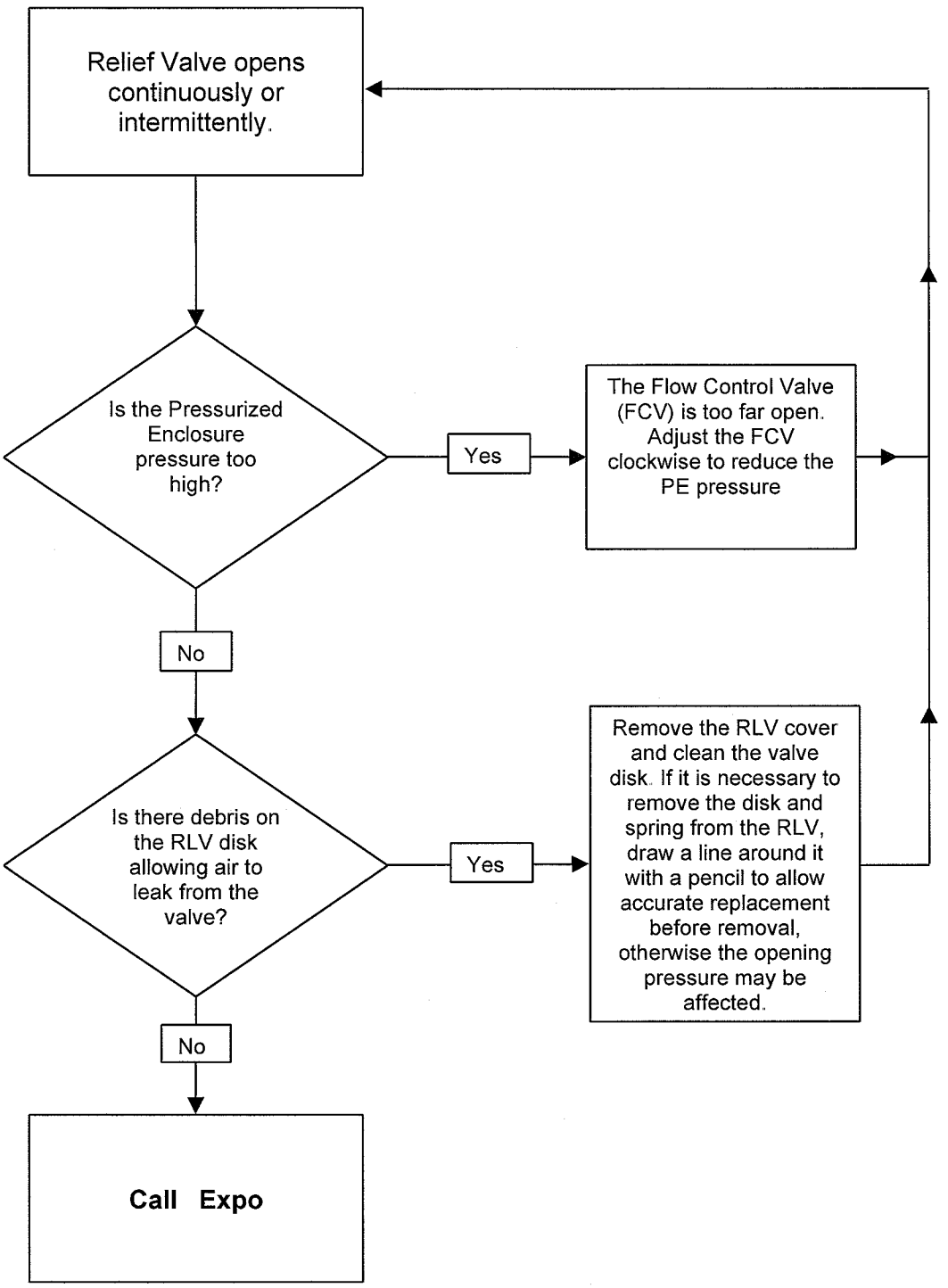
Before making the following checks verify that both the main air supply pressure to the purge system & the regulated pressure to the logic is as specified on the system specification sheet.

Different flow charts for faulting have been provided for both the CF and LC options.

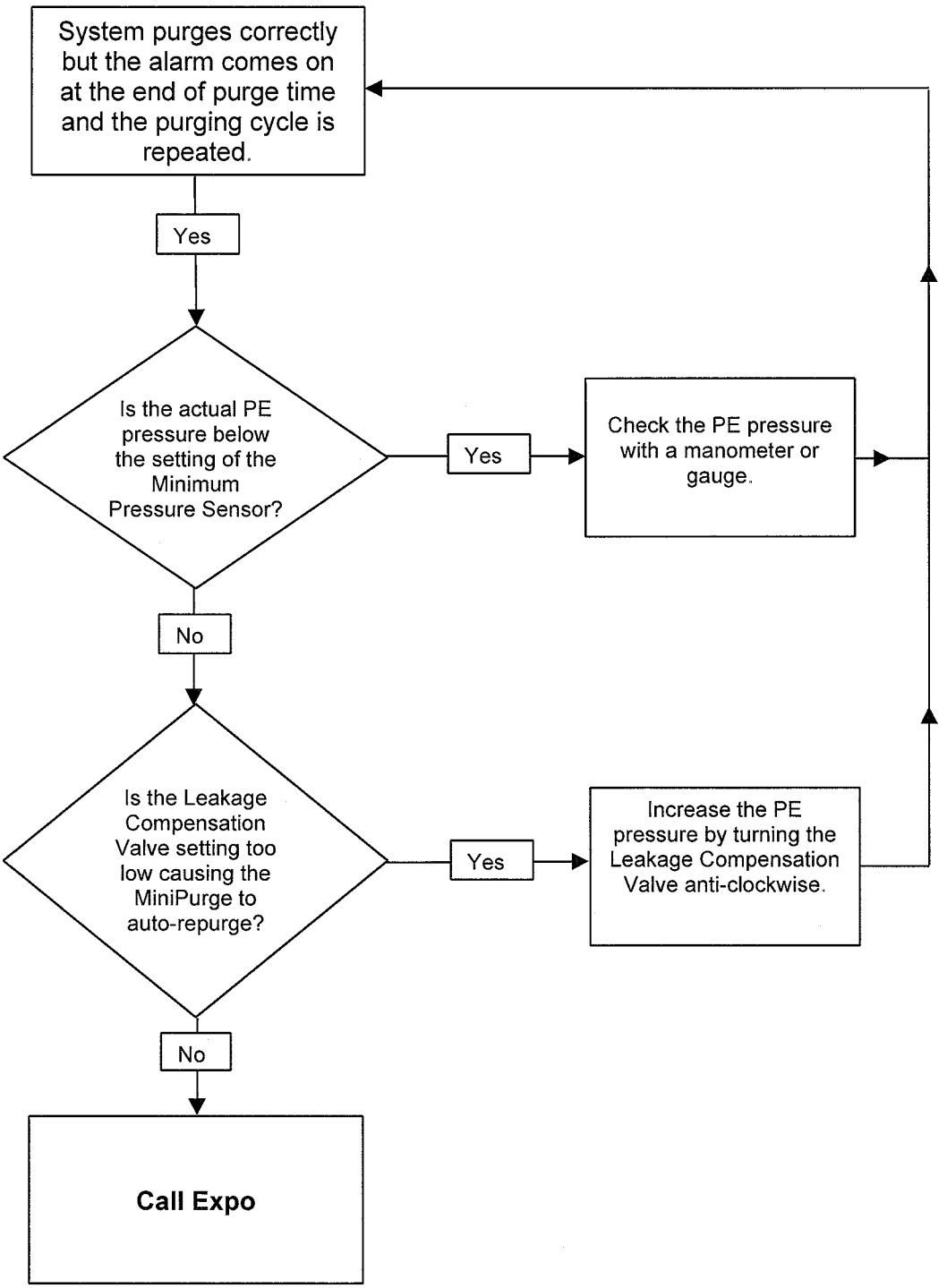
Fault Finding (CF)

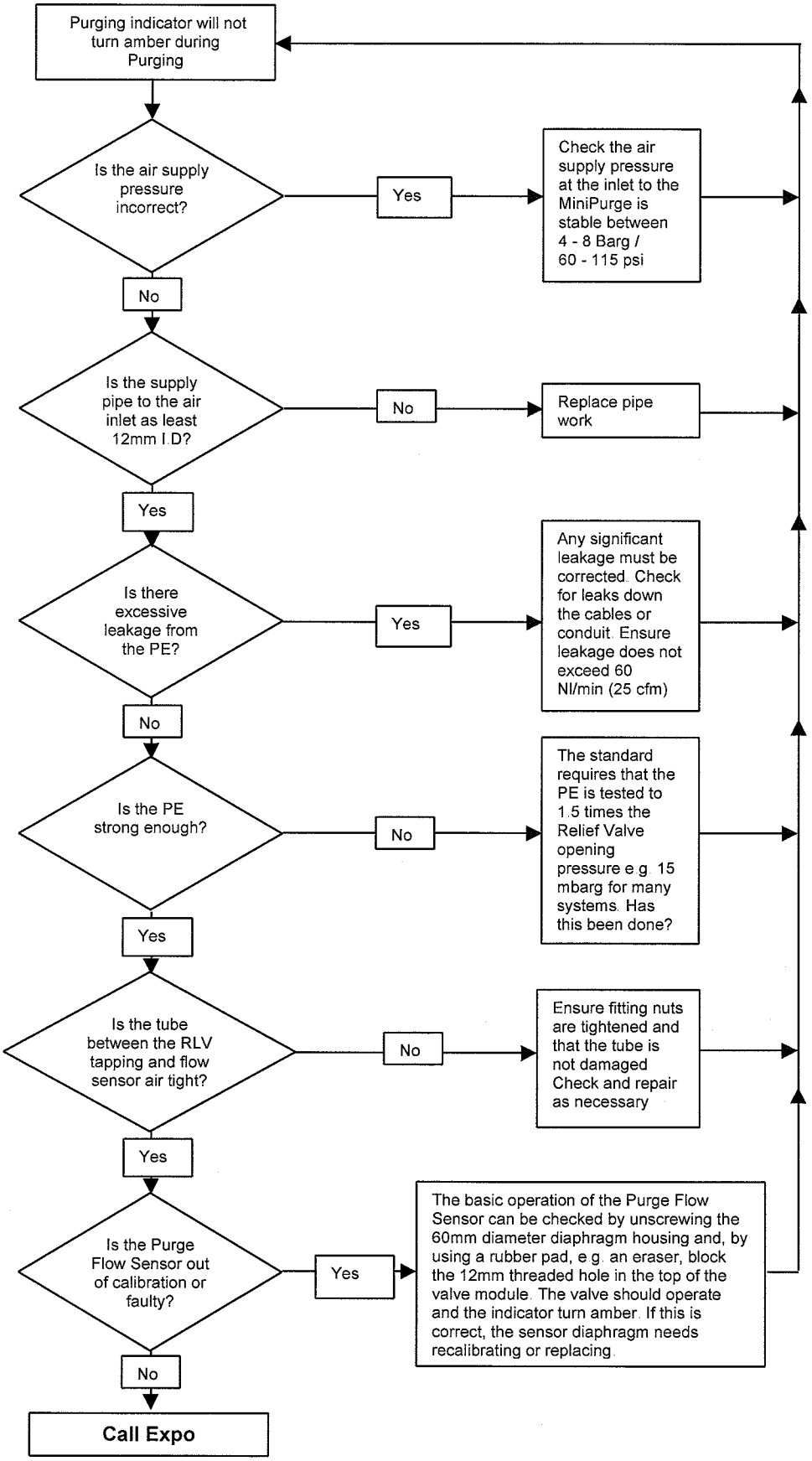

Pressurized/Purging indicator will not turn green during start up
Is the air supply pressure incorrect?
Yes
Check the air supply pressure at the inlet to the MiniPurge is stable between 4 - 8 Barg / 60 - 115 psi
No
Is the supply pipe to the air inlet as least 12mm I.D?
No
Replace pipe work
Yes
Is there excessive leakage from the PE?
Yes
Any significant leakage must be corrected. Check for leaks down the cables or conduit. Ensure leakage does not exceed 60 Nl/min (25 cfm)
No
Is the PE strong enough?
No
The standard requires that the PE is tested to 1.5 times the Relief Valve opening pressure e.g. 15 mbarg for many systems. Has this been done?
Yes
Is the Pressure / Flow Sensor out of calibration or faulty?
Yes
The basic operation of the Pressure Sensor can be checked by unscrewing the 60mm diameter diaphragm housing and, by using a rubber pad, e.g. an eraser, block the 12mm threaded hole in the top of the valve module. The valve should operate and the indicator turn green. If this is correct, the sensor diaphragm needs recalibrating or replacing.
No
Call Expo

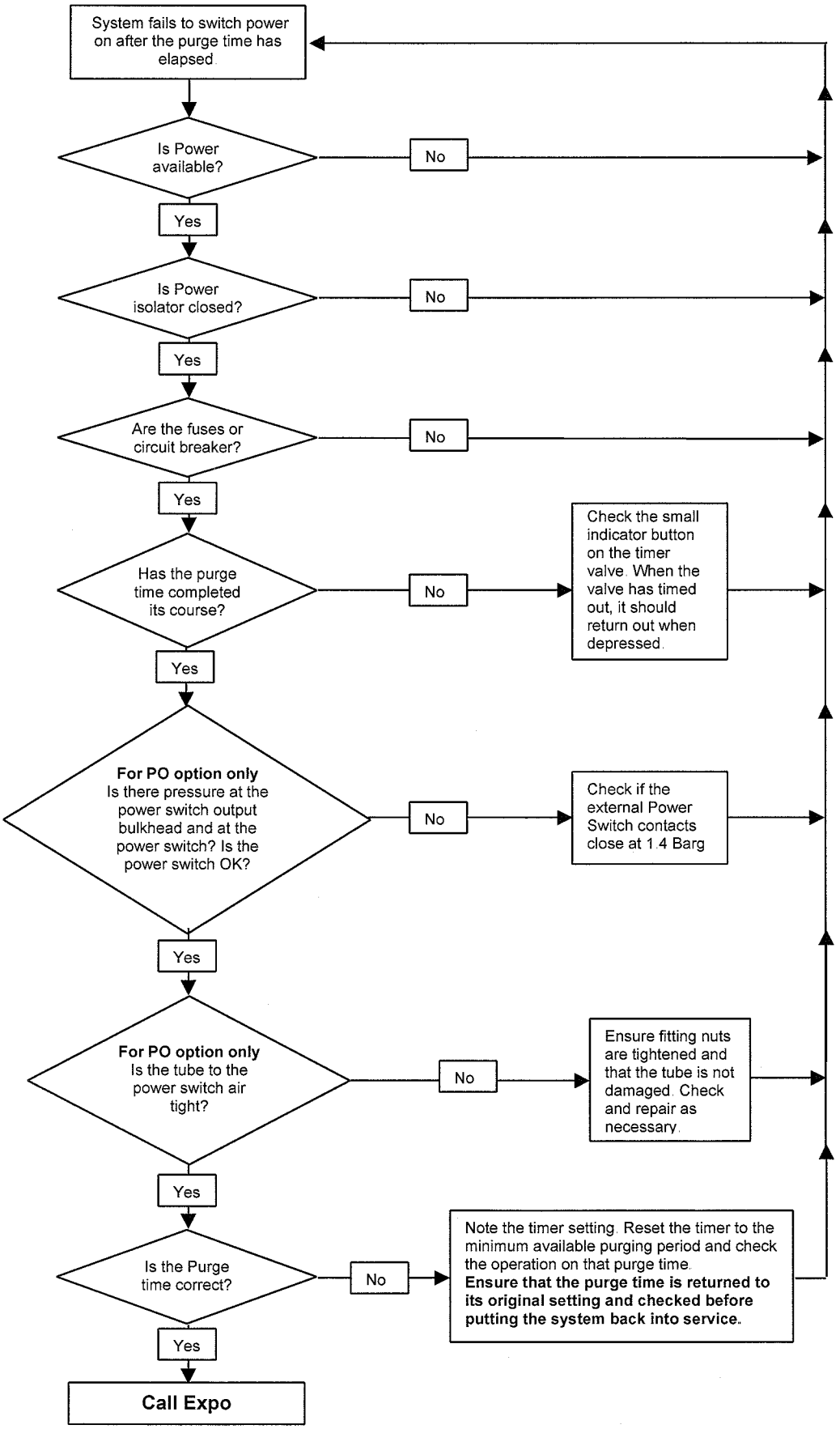

System fails to switch power on after the purge time has elapsed.
Is Power available?
No
Yes
Is Power isolator closed?
No
Yes
Are the fuses or circuit breaker?
No
Yes
Has the purge time completed its course?
No
Check the small indicator button on the timer valve. When the valve has timed out, it should return out when depressed
Yes
For PO option only
Is there pressure at the power switch output bulkhead and at the power switch? Is the power switch OK?
No
Check if the external Power Switch contacts close at 1.4 Barg
Yes
For PO option only
Is the tube to the power switch air tight?
No
Ensure fitting nuts are tightened and that the tube is not damaged. Check and repair as necessary.
Yes
Is the Purge time correct?
No
Note the timer setting. Reset the timer to the minimum available purging period and check the operation on that purge time.
Ensure that the purge time is returned to its original setting and checked before putting the system back into service.
Yes
Call Expo

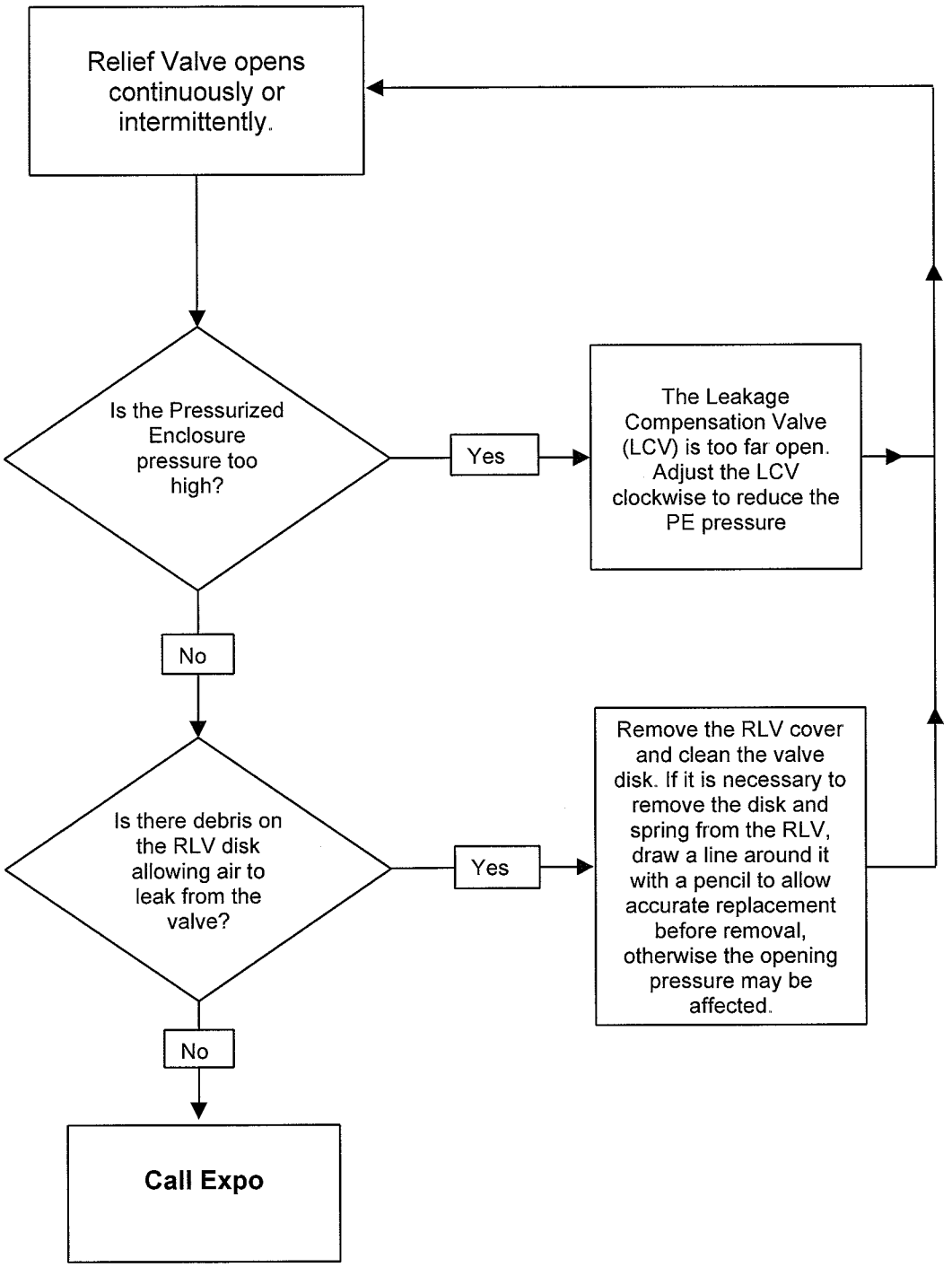

Relief Valve opens continuously or intermittently.
Is the Pressurized Enclosure pressure too high?
Yes
The Flow Control Valve (FCV) is too far open. Adjust the FCV clockwise to reduce the PE pressure
No
Is there debris on the RLV disk allowing air to leak from the valve?
Yes
Remove the RLV cover and clean the valve disk. If it is necessary to remove the disk and spring from the RLV, draw a line around it with a pencil to allow accurate replacement before removal, otherwise the opening pressure may be affected.
No
Call Expo

Fault Finding (LC)


System purges correctly but the alarm comes on at the end of purge time and the purging cycle is repeated.
Yes
Is the actual PE pressure below the setting of the Minimum Pressure Sensor?
Yes
Check the PE pressure with a manometer or gauge.
No
Is the Leakage Compensation Valve setting too low causing the MiniPurge to auto-repurge?
Yes
Increase the PE pressure by turning the Leakage Compensation Valve anti-clockwise.
No
Call Expo


Purging indicator will not turn amber during Purging
Is the air supply pressure incorrect?
Yes
Check the air supply pressure at the inlet to the MiniPurge is stable between 4 - 8 Barg / 60 - 115 psi
No
Is the supply pipe to the air inlet as least 12mm I.D?
No
Replace pipe work
Yes
Is there excessive leakage from the PE?
Yes
Any significant leakage must be corrected. Check for leaks down the cables or conduit. Ensure leakage does not exceed 60 Nl/min (25 cfm)
No
Is the PE strong enough?
No
The standard requires that the PE is tested to 1.5 times the Relief Valve opening pressure e.g. 15 mbarg for many systems. Has this been done?
Yes
Is the tube between the RLV tapping and flow sensor air tight?
No
Ensure fitting nuts are tightened and that the tube is not damaged Check and repair as necessary
Yes
Is the Purge Flow Sensor out of calibration or faulty?
Yes
The basic operation of the Purge Flow Sensor can be checked by unscrewing the 60mm diameter diaphragm housing and, by using a rubber pad, e.g. an eraser, block the 12mm threaded hole in the top of the valve module. The valve should operate and the indicator turn amber. If this is correct, the sensor diaphragm needs recalibrating or replacing.
No
Call Expo


System fails to switch power on after the purge time has elapsed.
Is Power available?
No
Yes
Is Power isolator closed?
No
Yes
Are the fuses or circuit breaker?
No
Yes
Has the purge time completed its course?
No
Check the small indicator button on the timer valve. When the valve has timed out, it should return out when depressed.
Yes
For PO option only
Is there pressure at the power switch output bulkhead and at the power switch? Is the power switch OK?
No
Check if the external Power Switch contacts close at 1.4 Barg
Yes
For PO option only
Is the tube to the power switch air tight?
No
Ensure fitting nuts are tightened and that the tube is not damaged. Check and repair as necessary.
Yes
Is the Purge time correct?
No
Note the timer setting. Reset the timer to the minimum available purging period and check the operation on that purge time.
Ensure that the purge time is returned to its original setting and checked before putting the system back into service.
Yes
Call Expo


Relief Valve opens continuously or intermittently.
Is the Pressurized Enclosure pressure too high?
Yes
The Leakage Compensation Valve (LCV) is too far open. Adjust the LCV clockwise to reduce the PE pressure
No
Is there debris on the RLV disk allowing air to leak from the valve?
Yes
Remove the RLV cover and clean the valve disk. If it is necessary to remove the disk and spring from the RLV, draw a line around it with a pencil to allow accurate replacement before removal, otherwise the opening pressure may be affected.
No
Call Expo

Approval Documents

System type	Approval authority	Certificate number
X purge	Sira	01ATEX 1295X
	FM	1X8A4.AE
	UL	E190061
	*Standards Australia	*Ex 3199U

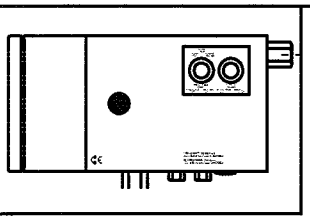
For PA option only	Approval authority	Certificate number
Ex e junction box	Baseefa	Baseefa04ATEX0218
EEx d switches	PTB	00 ATEX 1093X

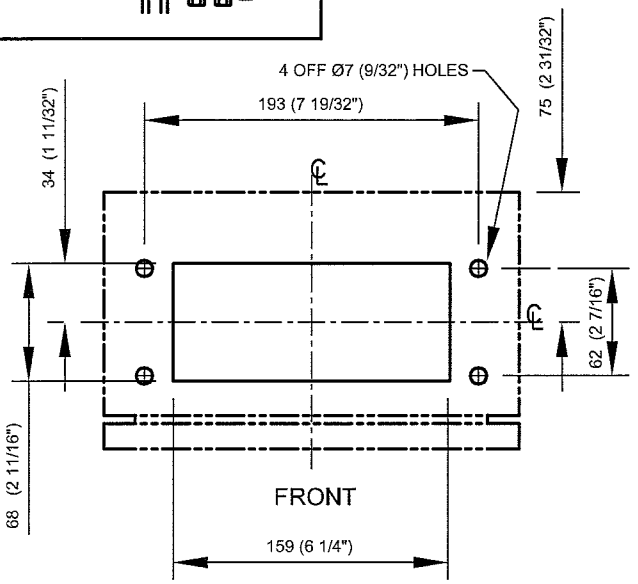
*Available upon request

Glossary

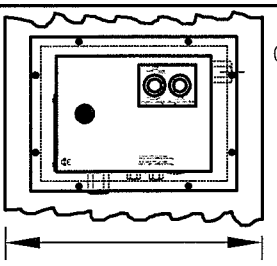
Acronym	Description
A&T	Alarm and trip
AO	Alarm only
CF	Continuous flow
CU	Control unit
FCV	Flow control valve
FM	Factory Mutual
IS	Intrinsically safe
LC	Leakage compensation
LCV	Leakage compensation valve
MIU	MiniPurge Interface Unit
PA	Ex d power and alarm switch wired to Ex e terminal box
PE	Pressurized Enclosure
PO	Pneumatic output
RLV	Relief valve
SAU	Spark arrestor universal

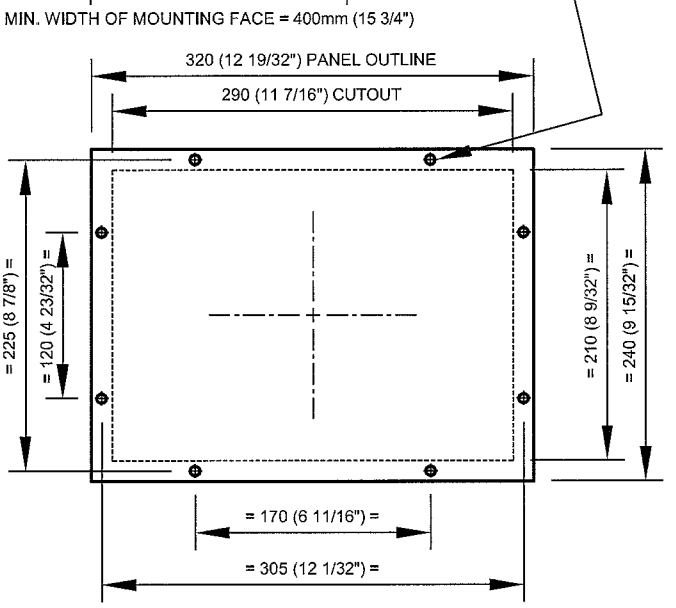
PREFERED OPTION
DIRECT MOUNT
(ON TOP OF ENCLOSURE)



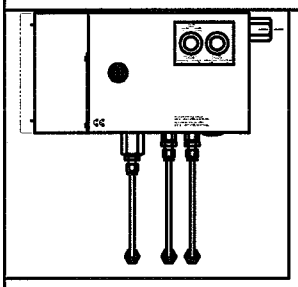


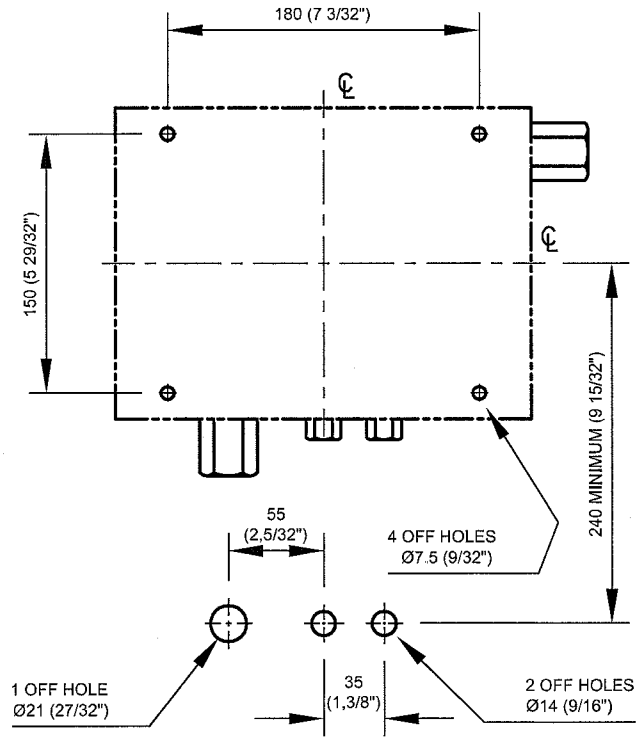
PANEL MOUNT
(ON FRONT OR SIDE OF ENCLOSURE)



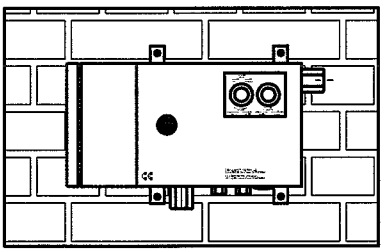


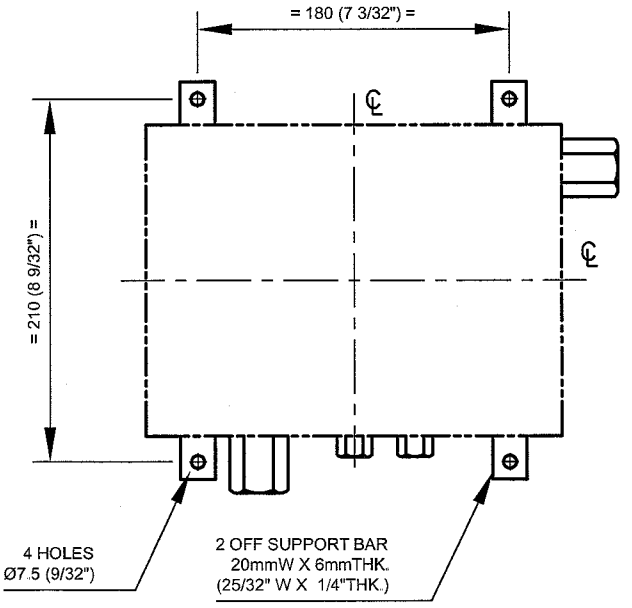
REAR MOUNT
(ON SIDE OF ENCLOSURE)





REMOTE MOUNT
(ON WALL OR PANEL)





XBR-7TD0-004 ISSUE 3

Sub MiniPurge Systems
MOUNTING DETAILS

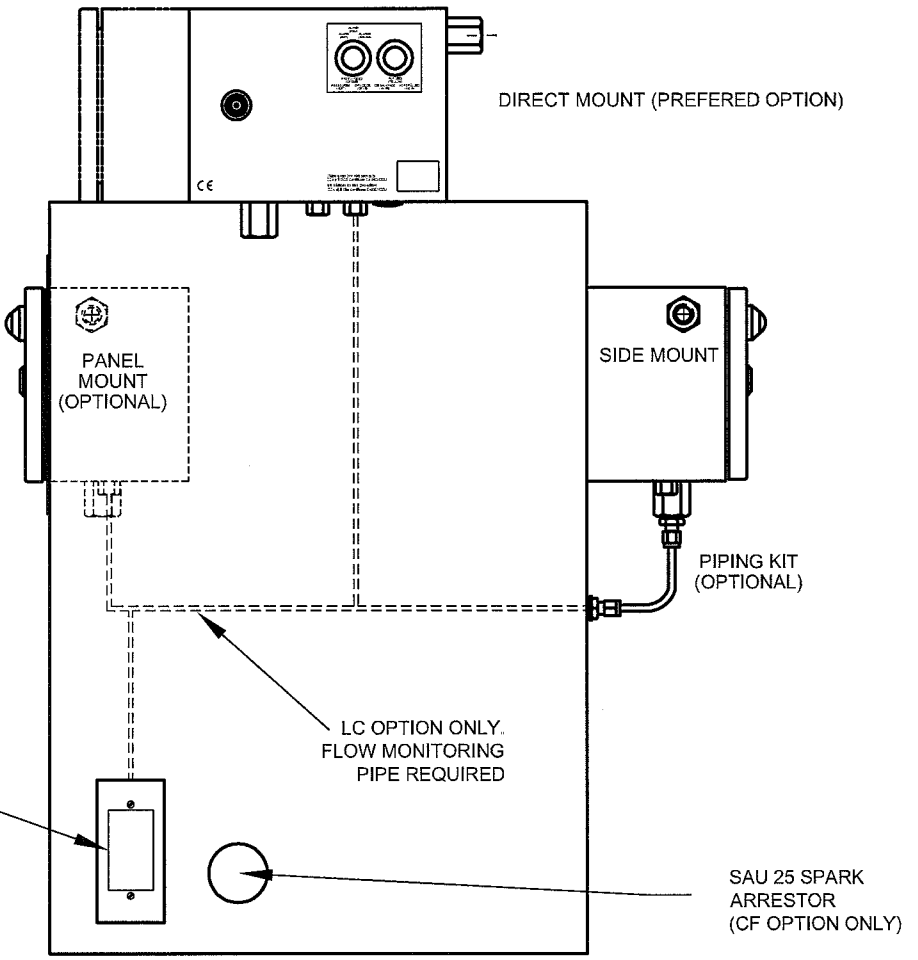
MiniPurge CONFIGURATION

NOTES:

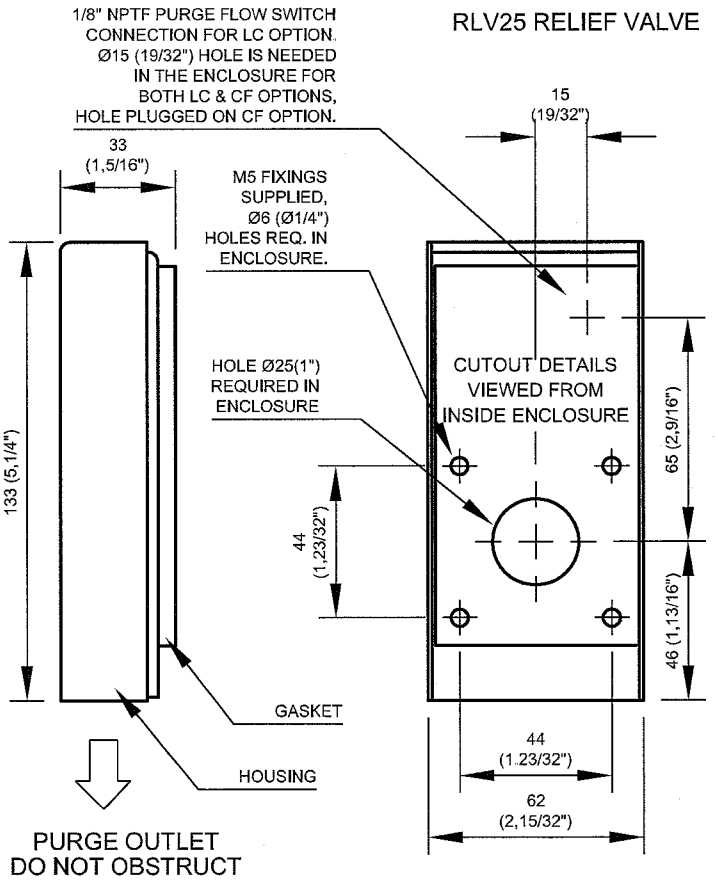
1) USE DIRECT MOUNTING WHEREVER POSSIBLE, WALL MOUNTING BRACKETS AND PIPING KITS FOR SIDE MOUNTING ARE OPTIONAL

2)MINIPURGE MUST BE MOUNTED IN THE POSTIONS SHOWN.

3)PURGE AIR TO VENT INTO TOP OF THE ENCLOSURE AND EXIT THROUGH THE RELIEF VALVE/SPARK ARRESTOR AT THE BOTTOM OF THE ENCLOSURE

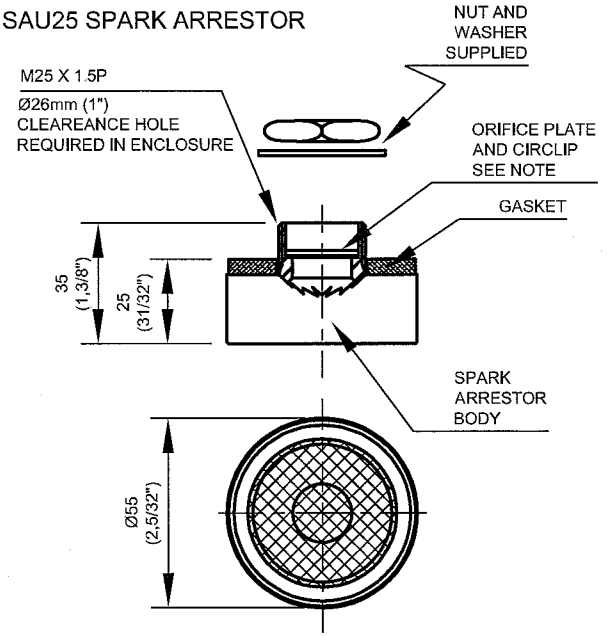

DIRECT MOUNT (PREFERED OPTION)
PANEL MOUNT (OPTIONAL)
SIDE MOUNT
PIPING KIT (OPTIONAL)
LC OPTION ONLY. FLOW MONITORING PIPE REQUIRED
RLV 25 RELIEF VALVE
SAU 25 SPARK ARRESTOR (CF OPTION ONLY)

RLV25 RELIEF VALVE


1/8" NPTF PURGE FLOW SWITCH CONNECTION FOR LC OPTION. Ø15 (19/32") HOLE IS NEEDED IN THE ENCLOSURE FOR BOTH LC & CF OPTIONS, HOLE PLUGGED ON CF OPTION.
33 (1,5/16")
15 (19/32")
M5 FIXINGS SUPPLIED, Ø6 (Ø1/4") HOLES REQ. IN ENCLOSURE.
HOLE Ø25(1") REQUIRED IN ENCLOSURE
CUTOUT DETAILS VIEWED FROM INSIDE ENCLOSURE
133 (5,1/4")
44 (1,23/32")
65 (2,9/16")
46 (1,13/16")
GASKET
HOUSING
44 (1.23/32")
62 (2,15/32")
PURGE OUTLET DO NOT OBSTRUCT

WEIGHT = 0.5 kg (`1.1 lb)

SAU25 SPARK ARRESTOR

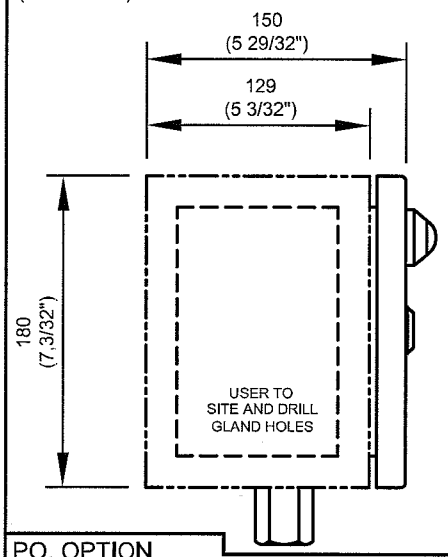


WEIGHT = 0.2 kg (0.44 lb)

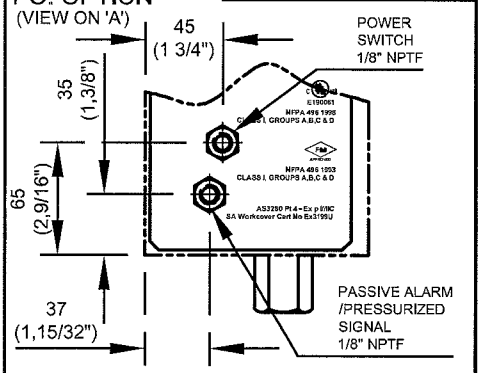
NOTE:-
SYSTEMS SUPPLIED WITHOUT ENCLOSURES ARE SUPPLIED WITH A RANGE OF 8 ORIFICE PLATES TO SUIT FLOW RATES BETWEEN 10-225 NL/MIN (0.4-8 SCFM)

Sub MiniPurge Systems CONFIGURATION

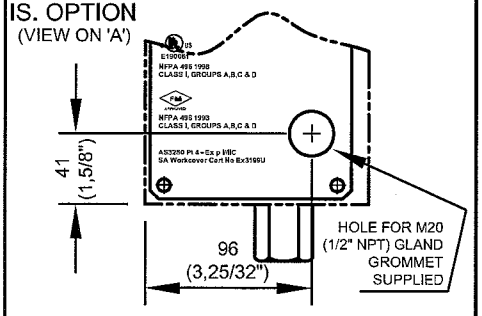
PA. OPTION (EUROPEAN CERT. ONLY)
(VIEW ON 'A')



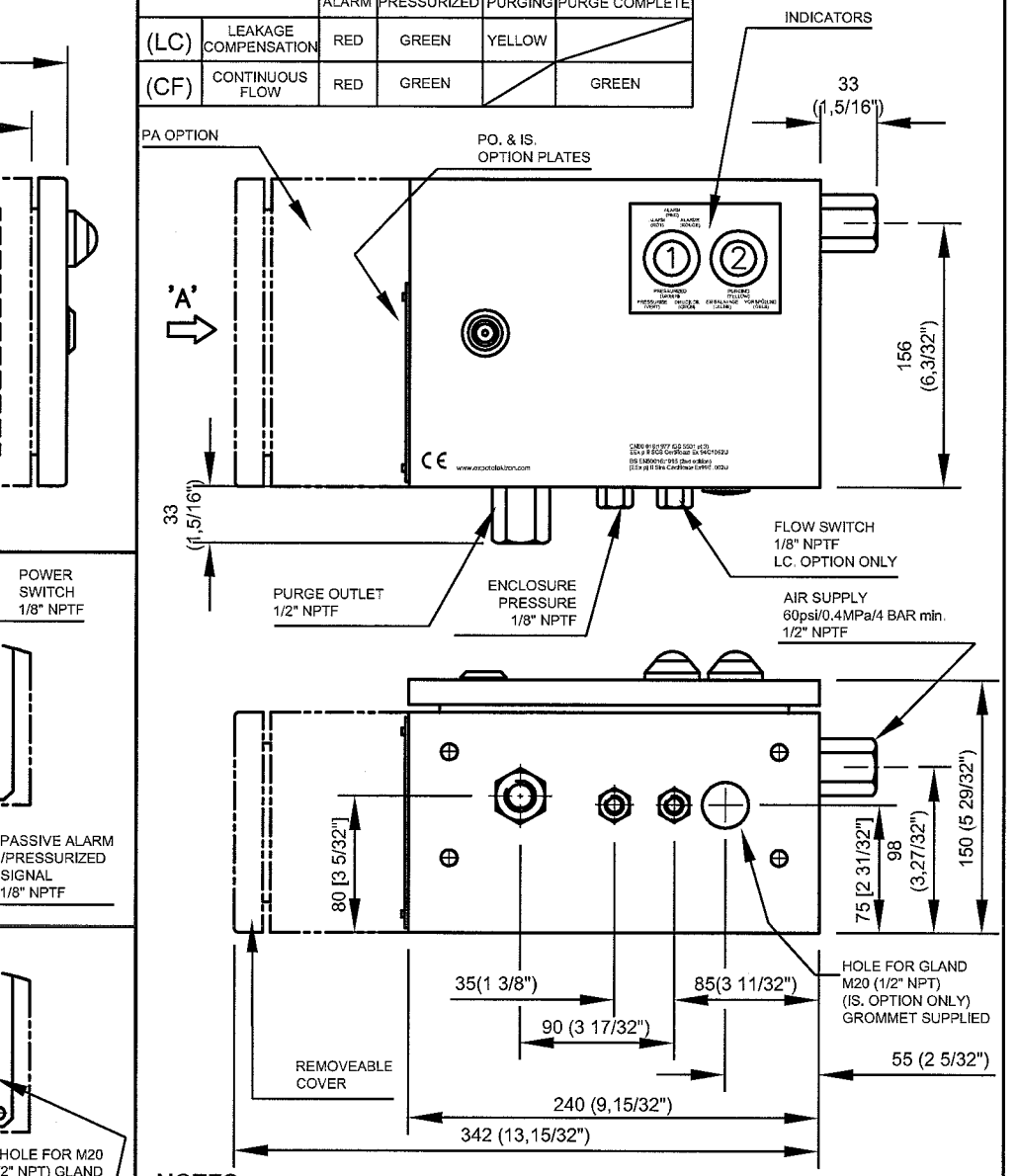
PO. OPTION
(VIEW ON 'A')



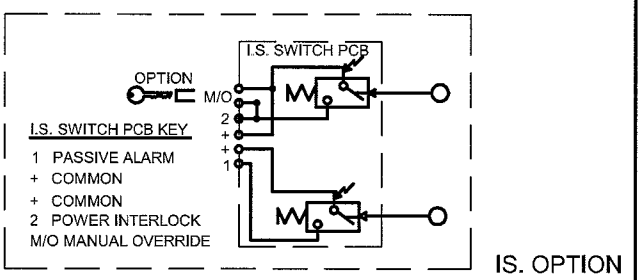
IS. OPTION
(VIEW ON 'A')



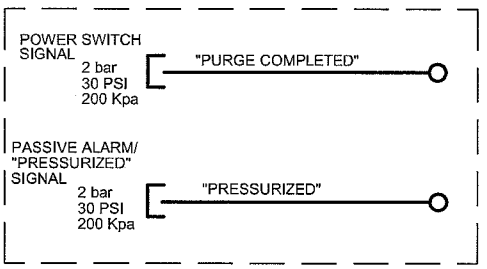
OPTION		INDICATOR 1		INDICATOR 2	
		ALARM	PRESSURIZED	PURGING	PURGE COMPLETE
(LC)	LEAKAGE COMPENSATION	RED	GREEN	YELLOW	
(CF)	CONTINUOUS FLOW	RED	GREEN		GREEN



NOTES:
1) APPROXIMATE WEIGHT: 5 Kg [11 POUNDS]
2) EQUIVALENT IMPERIAL DIMENSIONS SHOWN IN BRACKETS.

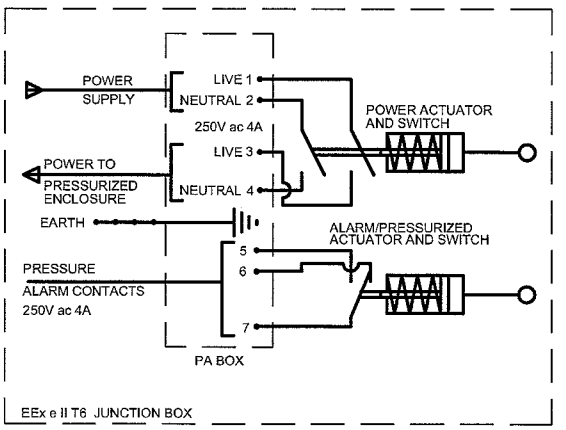


IS. OPTION



(MANUAL OVERRIDE OPTION AVAILABLE
AS KEY SWITCH IN THE ENCLOSURE)

PO. OPTION



(MANUAL OVERRIDE OPTION AVAILABLE
AS KEY SWITCH IN THE ENCLOSURE)

PA. OPTION

XBR-7TD0-002 ISSUE 4

Sub MiniPurge Systems
OVERALL DIMENSIONS

sira
Certification Service

1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: Sira 01ATEX1295X

4 Equipment: Purge Controllers - Sub-MiniPurge, MiniPurge, Super-MiniPurge, Super-MiniPurge 1800/3500/7000/7000X

5 Applicant: Expo – Telektron Safety Systems Ltd

6 Address: Summer Road
Thames Ditton
Surrey
KT7 0RH
UK

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report number R53A7169A and project number 51V8628.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 50014: 1997 +amendments 1,2
EN 50016: 1995

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:

II 2(2) G
[EEx p] II T6 (Ta = -20°C to +55°C)

Project Number 51V8628
Date 3 July 2002
C. Index 12

M D Shearman
Certification Manager

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Sira Certification Service
Rake Lane, Eccleston, Chester, CH4 9JN. England
Tel: +44 (0) 1244 670900 Fax: +44 (0) 1244 681330
Email: exhazard@siratc.co.uk
Sira Certification Service is a service of Sira Test & Certification Ltd

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

Sira 01ATEX1295X

13 **DESCRIPTION OF EQUIPMENT**

There are seven models of Purge Controllers intended to provide a given flow rate of purging gas for a predetermined time to unspecified EEx p protected electrical equipment. The MiniPurge Control Units provide one of the following four methods of purge operation.

LC-Leakage compensation only after initial high purge
CF-Continuous flow (same flow rate during and after purging)
CF2-Two flow CF system with initial high purge rate only at one orifice
CFHP-Continuous (lower) flow after initial high purge

MiniPurge Model Number Designation

Typical Model No.:	1	X	LC	cs	DS	SS	AA	MO	FM	OA
Key:	a	b	cc	mm	additional options					

a = Model No

1 = Sub MiniPurge
2 = MiniPurge
3 = Super-MiniPurge
4 = Super-MiniPurge 1800
5 = Super-MiniPurge 3500
6 = Super-MiniPurge 7000
7 = Super-MiniPurge 7000x

b = Pressurization Standard Type

X = ATEX Directive EN 50016, 2nd Edition

cc = Action after initial purge

LC = Leakage compensation only after initial high purge
CF = Continuous flow (same flow rate during and after purging)
CF2 = Two flow CF system with initial high purge rate but only one orifice
CFHP = Continuous (lower) flow after initial high purge

mm = Material of the Control Unit Enclosure

al = Aluminium alloy (<6% light metals e.g. magnesium or titanium)
cs = Mild steel, painted
ss = Stainless steel
nm = Non-Metallic
bp = Back Plate only
co = Chassis only
pm = Panel mounting

Date 3 July 2002

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EC TYPE-EXAMINATION CERTIFICATE

Sira 01ATEX1295X

Additonal Options

Each MiniPurge controller model can also be fitted with the following options, for which there is a separate option code as follows:

AA = Active Alarm output fitted
AC = Alarm cancellation circuit
AO = "Alarm Only" Action on Pressure or Flow Failure
AS = Alarm "Action on Pressure or Flow Failure", Selector Valve
CS = Containment System monitor
DS = Door switch Power Interlock fitted
DT = Delayed Trip after Pressure or Flow failure
FM = Flow Meter(s) fitted
IS = Internal Switches suitable for Ex i circuits
MO = Manual Over-ride fitted
MT = Mechanical Purge or Delay timer
OA = On/Off switch controlling Protective gas and logic supply
OB = On/Off switch controlling logic supply only
OC = On/Off switch controlling Protective gas supply only
OS = Outlet (Orifice) Selector valve
OV = Outlet valve, pneumatically operated
PA = "Ex" switch(es) built-in, with/without "Ex" junction box
PC = PE Pressure Control Leakage Compensation Valve
PO = Pneumatic Output signals for Power and Alarm control
SP = Secondary Pressurisation supply options
SS = Separate Supply for Protective gas and Logic air
TW = Twin (or more) outputs for two or more separate PEs purged in parallel

Relief Valve

The MiniPurge controller is supplied with either an optional overpressure relief valve, which is to be fitted to the EEx p protected apparatus to prevent an internal overpressure above the maximum overpressure rating of the apparatus. There are 14 models of relief valve; the designation of each relief valve refers to its nominal bore in mm, as follows:

RLV3, RLV6, RLV9, RLV12, RLV19, RLV25, RLV26, RLV52, RLV36, RLV75, RLV104, RLV125, RLV150 and RLV200

The outlet of each relief valve is fitted with a spark arrestor, of which there are three optional types as follows:

Metal Foam

Tortuous path, with at least 4 x 90°or 2 x 180° bends

Multi-layer stainless steel mesh

Date 3 July 2002

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Sira 01ATEX1295X

Outlet Orifice

Three types of orifice are used:

Threaded Orifices e.g. ¼" NPT or 2" BSP with a built in spark arrester. These are selected to maintain a desired back pressure within the EEx p protected apparatus when used with the Continuous Flow options. The designation of each outlet orifice indicates the nominal inlet diameter. The designations are as follows:

SA3, SA6, SA9, SA12, SA19, SA25, SA32, SA38 and SA50.

Plain holes in the Relief Valve disk, sized according to the flow rate required.

Replaceable orifice type SAU**.

High Pressure Sensor

The system relief valve may be replaced with a High Pressure Sensor. If the pressure in the purged enclosure rises above the setting of the high pressure sensor the controller resets cutting the power to the purge protected enclosure(s). On detecting the overpressure the optional facility is available for the generation of an alarm or indicator.

System with high pressure sensors will carry the option code HP

Pneumatically Operated Outlet Valve

The pneumatically operated outlet valve is used to positively open or close the outlet of the purged enclosure by means of a spring return pneumatic cylinder.

Systems fitted with the Pneumatically Operated Outlet Valve will carry the option OV.

14 **DESCRIPTIVE DOCUMENTS**

14.1

Drawing	Rev.	Sheet	Date	Title
SD7281	3	1 to 4	02 Jul 02	MiniPurge ATEX Certification Labelling
SD7282	2	1 to 2	21 May 01	MiniPurge ATEX Certification Type Numbering Scheme
EP/99-2-17	1	1 of 1	21 Sep 00	MiniPurge, Continuous Flow with /HP Sensor –Schematic diagram
EP99-7-7	1	1 of 1	21 Sep 00	RLV, outlet orifice
EP99-7-9	1	1 of 1	21 Sep 00	Outlet Valve Control Circuit Diagram

14.2 Report No. R53A7169A

15 **SPECIAL CONDITIONS FOR SAFE USE**

15.1 When the MiniPurge Control Unit is incorporated into equipment, the following considerations shall be included in the assessment of the equipment:

Where applicable, the implications of the operation of the manual override (MO option) and application of appropriate warning labels.

Where applicable, the requirement for an intrinsically safe supply to the switches incorporated in the IS option.

Where applicable, the implications of the operation of the optional alarm indicators and/or signals and application of appropriate warning and identification labels.

Date 3 July 2002

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE Sira 01ATEX1295X

15.2 When using the AO, AS and DT options, the recommendations for the additional requirements of EEx p apparatus contained within EN 60079-14 shall be applied.

15.3 The installer/user shall ensure that the MiniPurge Control Unit is installed in accordance with the equipment certificate that covers the combination of the pressurised enclosure(s) and MiniPurge Control Unit.

15.4 The values of the safety parameters shall be set in accordance with the equipment certificate that covers the combination of the pressurised enclosure(s) and MiniPurge Control Unit.

15.5 This MiniPurge Control Unit shall be incorporated into equipment and the appropriate Conformity Assessment Procedures applied to the combination as defined by Directive 94/9/EC. This certificate is not a certificate that covers the combination.

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in Report No.R53A7169A.

17 **CONDITIONS OF CERTIFICATION**

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of SCS Certificates.

17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.

17.3 The switches incorporated in the PA option shall be suitably certified for Category 2.

17.4 The following routine tests shall be performed by the manufacturer:

Verification of Minimum Overpressure Cut Off

An overpressure loss shall be simulated whilst the MiniPurge Control Unit is cycling, it shall be verified that the controller provides the appropriate output and resets.

Verification of Purge Failure Protection

A purge failure shall be simulated whilst the MiniPurge Control Unit is cycling, it shall be verified that the controller provides the appropriate output and resets.

Verification of Air Supply Failure Protection

An air supply failure shall be simulated whilst the MiniPurge Control Unit is cycling, it shall be verified that the controller provides the appropriate output and resets.

Verification of Purging Overpressure protection

Where the HP is specified an overpressure shall be simulated whilst the MiniPurge Control Unit is cycling, it shall be verified that the controller provides the appropriate output and resets.

Date 3 July 2002

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-5 DEC 2002

FM Approvals
1151 Boston-Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: 781 762 4300 F: 781 762 9375 www.fmglobal.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

Associated Type X Pressurization Apparatus for Class I, Division 1, Groups A, B, C, and D when installed per document M496LC

aXLCbc. Mini-X-Purge Type LC Control System — (EP80-2-11 for Option '/IS')

aXCFHPbc. Mini-X-Purge Type CFHP Control System — (EP80-2-11 for Option '/IS')

Associated Type X Pressurization Apparatus for Class I, Division 1, Groups A, B, C, and D when installed per document M496CF

aXCFbc . Mini-X-Purge Type CF Control System — (EP80-2-11 for Option '/IS')

Associated Type Y Pressurization Apparatus for Class I, Division 1, Groups A, B, C, and D when installed per document M496LC

aYLCbc. Mini-Y-Purge Type LC Control System — (EP80-2-11 for Option '/IS')

aYCFHPbc. Mini-Y-Purge Type CFHP Control System — (EP80-2-11 for Option '/IS')

Associated Type Y Pressurization Apparatus for Class I, Division 1, Groups A, B, C, and D when installed per document M496CF

aYCFbc. Mini-Y-Purge Type CF Control System — (EP80-2-11 for Option '/IS')

Associated Type Z Pressurization Apparatus for Class I, Division 2, Groups A, B, C, and D when installed per document M496LC

aZLCbc. Mini-Z-Purge Type LC Control System — (EP80-2-11 for Option '/IS')

aZCFHPbc. Mini-Z-Purge Type CFHP Control System — (EP80-2-11 for Option '/IS')

Associated Type Z Pressurization Apparatus for Class I, Division 2, Groups A, B, C, and D when installed per document M496CF

aZCFbc. Mini-Z-Purge Type CF Control System — (EP80-2-11 for Option '/IS')

Associated Type X Pressurization Apparatus for Class II, Division 1, Groups E, F, & G when installed per document M496DP

aXDPbc. Mini-X-Purge Type DP Control System — (EP80-2-11 for Option '/IS')

Associated Type Y Pressurization Apparatus for Class II, Division 1, Groups E, F, & G when installed per document M496DP

aYDPbc. Mini-Y-Purge Type DP Control System — (EP80-2-11 for Option '/IS')

Associated Type Z Pressurization Apparatus for Class II, Division 2, Groups F & G when installed per document M496DP

aZDPbc. Mini-Z-Purge Type DP Control System — (EP80-2-11 for Option '/IS')

where:
a = Model size 1, 2, 3, 4, 5, or 6
b = Enclosure material cs, ss, bp, or nm
c = Option code AA, AC, AO, AS, CT, DS, DT, FM, IS, MO, MT, NO, OA, OB, OC, OS, PC, SS, TW, and/or **

** denotes special, non-Approval related options such as color or enclosure mounting arrangements.

☞ All LC Systems must include an RLV Series Relief Valve matched to the specific control system.

☞ All CF and CFHP Systems must include an RLV Series Relief Valve matched to the specific control system with either an internal or separate Outlet Orifice.

RLVabcd. Relief Valve

a = Vent size 3, 6, 9, 12, 19, 25, 36, 52, 75, or 104.
b = Option code Blank, CF + (size in mm) and/or FS.
c = Casing material cs, ss, or br.
d = Thread type NPT, BSP, Metric Pipe, API, or Pg.

SAabc. Outlet Orifice / Spark Arrestor

a = Nominal size 3, 6, 9, 12, 19, 25, 32, 38, or 50
b = Casing material cs or ss
c = Thread type NPT, BSP, Metric Pipe, API, or Pg

SAUa. Outlet Orifice / Spark Arrestor - Universal

a = Nominal size 25, 32, or 50

Equipment Ratings:

Control Apparatus Associated with Pressurized Electrical Equipment for hazardous (classified) locations.

Approved for:

Expo Telektron Safety Systems Ltd.
Summer Road
Thames Ditton, Surrey KT7 0RH
United Kingdom

This certifies that the equipment described has been found to comply with the following FM Approval Standards and other documents:

Class 3600	1998
Class 3620	2000

Original Project ID: 1X8A4.AE FM Approval Granted: April 8, 1994

Subsequent Revision Reports / Date FM Approval Amended

Report Number	Date	Report Number	Date
0B3A3.AE	November 5, 1996	3010469	June 25, 2001

FM Global Technologies LLC

Andrew Lozinski
Technical Team Manager

November 27, 200
Date

An FM Global Enterprise

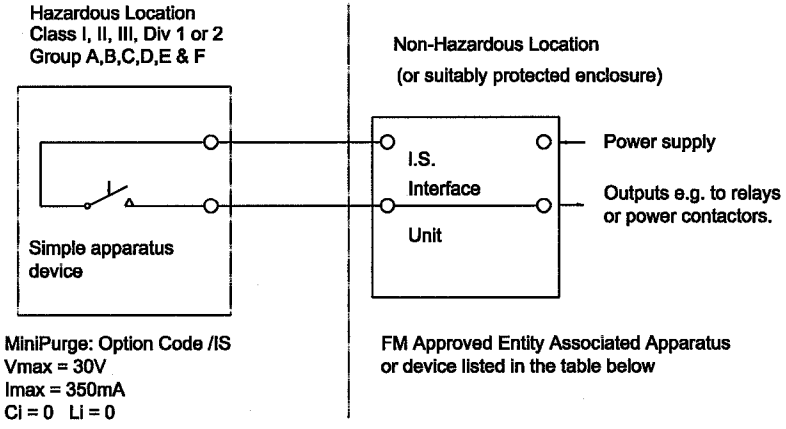
3rd ANGLE PROJECTION

DIMENSIONS IN mm. UNSPECIFIED TOLERANCES NO DEC. PLACE ±0.5, 1 DEC. PLACE ±0.2, 2 DEC. PLACE ±0.1

FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

The contents of this Drawing/Document are copyright. They are to be treated as confidential and are returnable upon request. They are not to be copied communicated in part or whole without written consent from Expo Telektron Safety Systems Ltd. Neither are they to be used in any way against our interests.

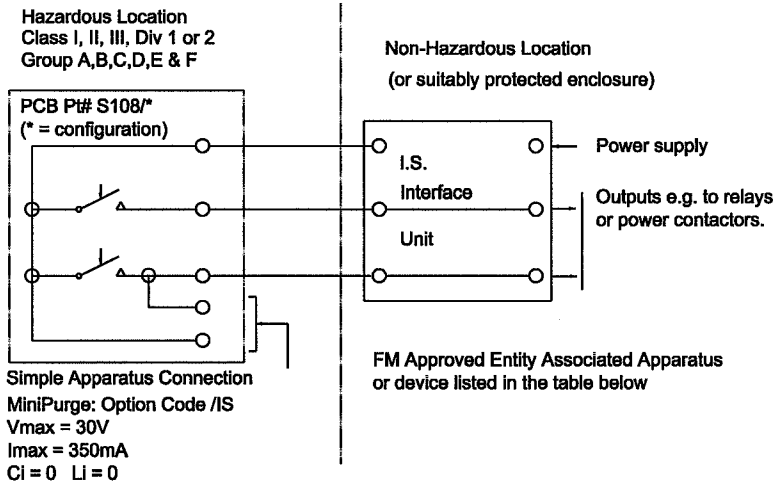
Fig 1a Single channel interface circuit
e.g. "Y" or "Z" Pressurization Alarm circuit



MiniPurge: Option Code /IS
Vmax = 30V
Imax = 350mA
Ci = 0 Li = 0

FM Approved Entity Associated Apparatus or device listed in the table below

Fig 1b Multi-channel interface circuit
e.g. "X" pressurization Alarm & Power Control



Simple Apparatus Connection
MiniPurge: Option Code /IS
Vmax = 30V
Imax = 350mA
Ci = 0 Li = 0

FM Approved Entity Associated Apparatus or device listed in the table below

Notes for both Fig 1a and Fig 1b

1 Electrical equipment connected to associated apparatus should not use or generate more than 250 volts
2 Installation shall be in accordance with the manufacturer's instructions and the National Electrical Code (ANSI/NFPA 70)
3 For guidance on Installation see ANSI/ISA RP12.6, (Installation of IS Instrument Systems in Class I Hazardous Locations)
4 Voc or Vt of associated apparatus is less than Vmax
Isc or It of associated apparatus is less than Imax
Ci plus capacitance of interconnecting cabling is less than Ca of the associated apparatus
Li plus inductance of interconnecting cabling is less than La of the associated apparatus
5 "Simple Apparatus" is a device that will not generate or store more than 1.2V, 0.1A, 25mW or 20uJ

Manufacturer	Model	IS Output	Classification
Gems Sensors	44075		Class I, II Div 1 Grp A,B,C,D,E,F&G
Gems Sensors	64101		Class I, II Div 1 Grp A,B,C,D,E,F&G
Gems Sensors	144600		Class I, II Div 1 Grp A,B,C,D,E,F&G
Gems Sensors	25874		Class I, II Div 1 Grp A,B,C,D,E,F&G
Gems Sensors	25872		Class I, II Div 1 Grp A,B,C,D,E,F&G
Gems Sensors	54820		Class I, II Div 1 Grp A,B,C,D,E,F&G
Gems Sensors	54825		Class I, II Div 1 Grp A,B,C,D,E,F&G
Gems Sensors	54845		Class I, II Div 1 Grp A,B,C,D,E,F&G

Manufacturer	Model	IS Output	Classification
Gems Sensors	64101		Class I, II Div 1 Grp A,B,C,D,E,F&G

DO NOT SCALE

APP'D		ISSUE:-	1				MAT'L	FINISH
CHK'D		MOD. No:-	DRAWN					
		DATE:-	23.7.96					
DRN	AMO	APPROVED:-						
		DRAWING STATUS: CERT RELATED					DRG FILE:	

Expo Telektron Safety Systems Ltd SURREY, ENGLAND

TITLE: MINIPURGE OPTION 'IS'

JOB No:

CUSTOMER:

SCALE N.T.S

DRG. No. EP80-2-11

SHT. No. 1 OF 1

333 Pfingsten Road
Northbrook, Illinois 60062-2096
United States Country Code(1)
(847) 272-8800
FAX No. (847) 272-8129
http://www.ul.com

Underwriters Laboratories Inc.®

File E190061 Vol 1 Issued 1999-07-23
Revised 2003-05-08

FOLLOW-UP SERVICE PROCEDURE
(TYPE R)

PURGING AND PRESSURIZING CONTROLS AND
ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS
(RFPW,RFPW7)

Manufacturer: (466459-001)
EXPO TECHNOLOGIES LIMITED
SUMMER RD
THAMES DITTON
SURREY
KT7 0RH ENGLAND UNITED KINGDOM

Applicant: (466459-001)
SAME AS MANUFACTURER

Classified Company: (466459-001)
SAME AS MANUFACTURER

This Procedure authorizes the above Manufacturer to use the marking specified by Underwriters Laboratories Inc. only on products covered by this Procedure, in accordance with the applicable Follow-Up Service Agreement.

The prescribed Mark or Marking shall be used only at the above manufacturing location on such products which comply with this Procedure and any other applicable requirements.

The Procedure contains information for the use of the above named Manufacturer and representatives of Underwriters Laboratories Inc. and is not to be used for any other purpose. It is lent to the Manufacturer with the understanding that it is not to be copied, either wholly or in part, and that it will be returned to Underwriters Laboratories Inc. upon request.

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UNDERWRITERS LABORATORIES INC.

A.W. Schaefer
Vice President and General Manager
US and Canadian Operations

A

A not-for-profit organization
dedicated to public safety and
committed to quality service

1 # EC - TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3	EC - Type Examination Certificate Number:	**Baseefa04ATEX0218**
4	Equipment or Protective System:	**Type MIU B/e P1827 Minipurge Interface Unit**
5	Manufacturer:	**Expo Technologies Limited**
6	Address:	**Summer Road, Thames Ditton, Surrey, KT7 0RH**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Baseefa (2001) Ltd. Notified body number 1180, in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report No. **04(C)0442**

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014: 1997 + Amendments 1 & 2
EN 50019: 2000
EN 50281-1-1: 1998 + Amendment 1

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment or protective system. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include the following :

⟨Ex⟩ II 2GD EEx e II T100°C (T_{amb} -20°C to + 55°C) IP64

This certificate may only be reproduced in its entirety, without any change, schedule included.

Baseefa (2001) Ltd. Customer Reference No. **0379**

Project File No. **04/0442**

This certificate is granted subject to the general terms and conditions of Baseefa (2001) Ltd. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

Baseefa (2001) Ltd.
Health and Safety Laboratory Site, Harpur Hill,
Buxton, Derbyshire SK17 9JN
Telephone +44 (0) 1298 28255 Fax +44 (0) 1298 28216
e-mail info@baseefa2001.biz web site www.baseefa2001.biz
Registered in England No. 4305578 at 13 Dovedale Crescent, Buxton, Derbyshire, SK17 9BJ

R S SINCLAIR
DIRECTOR
On behalf of
Baseefa (2001) Ltd.

13 # Schedule

14 ## Certificate Number Baseefa04ATEX0218

15 Description of Equipment or Protective System

The **Type MIU B/e P1827 Minipurge Interface Unit** is rated up to 550V, 10A and comprises a Type PE2 Enclosure, manufactured in stainless steel by Expo Technologies Limited to EC Type Examination Certificate No. Sira 01ATEX1157U.

The enclosure is used to house up to twenty terminals, of Type WDU2.5 or TypeWPE2.5 or a combination thereof, manufactured by Weidmuller GmbH to EC Type Examination Certificate No. KEMA 98ATEX1683U.

Variation 0.1

An alternative **Type MIU B/e P1813 Minipurge Interface Unit** comprising a smaller enclosure, to the certificate as above, and containing only ten terminals, certified as above.

16 Report Number

Baseefa Certification Report No. 04(C)0442

17 Special Conditions for Safe Use

None

18 Essential Health and Safety Requirements

All relevant Essential Health and Safety Requirements are covered by the standards listed at item 9.

19 Drawings and Documents

Number	Issue	Date	Description
SD7464	2	08.06.2004	General Arrangement, Type MIU B/e P1827 Minipurge Interface Unit
SD7466	1	11.06.2004	General Arrangement, Type MIU B/e P1813 Minipurge Interface Unit

MiniPurge Interface Unit ATEX Certification
User Instruction Manual

Certification Data:

Manufacturer:	Expo Technologies Ltd, Thames Ditton, Surrey, UK
Hazardous Area Marking Code:	EEx e II T100°C IP64
	CE 0518 Ex II 2 G D
	Tamb -20°C to +55°C
Type:	MIU B/e P1827 or MIU B/e P1813
Certificate Number:	Baseefa04ATEX0218
Rating :	550V 10A
Serial Number:	YYYY/XZZZZZ
	YYYY = year of manufacture (i.e. 2004)
	XZZZZZ = serial number (i.e. M50031)

Application Suitability:

MiniPurge Interface Units are certified for use in Hazardous Areas where the Hazardous Area is non-mining (i.e. above ground) and the hazard is caused by flammable gasses or vapours.
The systems may be used in Zone 1 and Zone 2 Hazardous Areas. (ATEX Category 2 and 3 respectively.)
MiniPurge Interface Unit may be used for hazards of any gas group.
The following materials are used in the construction of MiniPurge Interface Units. If substances that will adversely affect any of these materials are present in the surrounding environment, please consult Expo Technologies for further guidance. This equipment is designed for use under normal industrial conditions of ambient temperature, humidity and vibration. Please consult Expo Technologies before installing this equipment in conditions that may cause stresses beyond normal industrial conditions

Materials of construction: Stainless Steel, Steel, Brass, Copper, Polyamide, PVC.

Only install commission, inspect, maintain or fault find when safe to do so.

Installation:

The MiniPurge Interface Unit shall be installed in accordance with relevant standards, such as EN 60 079-14, and any local codes of practice that are in force. Cable glands or other cable entry devices shall be appropriately certified and suitable for the cable and the conditions of use and be installed in accordance with the manufacturer's instructions. EN 60 079-14 contains guidance on the selection of appropriate cable glands.
The MiniPurge Interface Unit shall be connected to the MiniPurge Purge and Pressurization system in accordance with the instructions given in the handbook supplied with the pressurization system.
The external earth connection of the MiniPurge Interface unit shall be connected to earth using a minimum $4mm^2$ conductor.

Contact Terminals

For Type 1827 maximum x20 WDU2.5 or WPE2.5 earth terminals certified to KEMA98ATEX1683.
For Type 1813 maximum x10 WDU2.5 or WPE2.5 earth terminals certified to KEMA98ATEX1683.

Commissioning (Putting into use)

The installation of the cable glands, electrical and earth connections shall be inspected for correct installation before the unit is put into service. The lid shall be correctly fitted.

Maintenance

The condition of enclosure and associated cable glands shall be inspected for damage periodically. The terminals inspected for tightness and gaskets inspected for damage.

Fault Finding

If a wiring or signal fault occurs, check each terminated wire, terminals for tightness and gaskets for damage. External faults such as broken switches within the Control Unit may also require investigation.

Drawings and Diagrams

Refer to the manual supplied with the Control Unit for assembly and connection drawings.

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

PTB

(1) # EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 00 ATEX 1093 X

(4) Equipment: Limit switch, type 07-25.1-..../....

(5) Manufacturer: BARTEC Componenten und Systeme GmbH

(6) Address: D-97980 Bad Mergentheim

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 00-10203.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 EN 50018:1994

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

Ex II 2 G EEx d IIC T6 or T5

Zertifizierungsstelle Explosionsschutz

By order

Dr.-Ing. U. Klausmeyer
Regierungsdirektor

Braunschweig, December 7, 2000

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 1093 X

(15) Description of equipment

The limit switch of type 07-25.1-..../.... is used as an auxiliary switch for signal and control circuits. It will comprise one or two interrupting chambers and housings differing in their thermal resistance.

Connection is provided by means of an encapsulated connecting cable (open ended line).

Technical data

Rated insulation voltage *) ..... up to	500 V	
	Type 07-2511-..../.... and type 07-2581-..../....	
Rated operating voltage U_e	400 V	250 V
Rated current I_e ..... max.	2 A	0.15 A
Related to utilization category	AC-15	DC-13
	Type 07-2521-..1./.... to 07-25221-..4./....	
Rated operating voltage U_e	250 V	250 V
Rated current I_e ..... max.	5 A	0.4 A
Related to utilization category	AC-15	DC-13
	Type 07-2521-..6./....	
Rated operating voltage U_e	250 V	250 V
Rated current I_e ..... max.	2 A	0.4 A
Related to utilization category	AC-15	DC-13
	Type 07-2521-..7./.....	
Rated operating voltage U_e	400 V	250 V
Rated current I_e ..... max.	2 A	0.4 A
Related to utilization category	AC-15	DC-13
	Type 07-2521-..8./....	
Rated operating voltage U_e	500 V	250 V
Rated current I_e ..... max.	2 A	0.4 A
Related to utilization category	AC-15	DC-13

*) *depending on connecting cable used*

Provided the making and breaking capacity complies with the relevant conditions, rated values other than those specified above are accepted and will be defined by the manufacturer on the basis of the operating mode, utilization category, etc.

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Contacts depending on switching module	1 or 2 changeover contacts or 1 break and/or 1 make contact, 1 or 2 break contacts with positive opening operation			
Temperature	≤60 °C	70 °C	75 °C	90 °C
Temperature class		T6		
Type 07-2511-..X0/.... and 07-2581-..X0/.... Rated thermal current	7 A	--	3 A	--
Type 07-2511-..XX/.... and 07-2581-..XX/.... Rated thermal current	6 A	--	2 A	--
Temperature class	T6	T5	T6	T5
Type 07-2521-..X0/.... Rated thermal current	5 A	8 A	3 A	3 A
Type 07-2521-..XX/.... Rated thermal current	5 A	6 A	2 A	2 A

The limit switches of type 07-2511- and 07-2581- are designed for a temperature resistance of -55 °C to 100 °C.

The limit switch of type 07-2521- is designed for a temperature resistance of -20 °C to 115 °C.

Nominal conductor cross section ..... 2 to 8 x 1.5 mm²

(16) Test report PTB Ex 00-10203

(17) Special conditions for safe use

The limit switch shall be installed so as to provide for mechanical protection against impact energy in accordance with EN 50014 section 23.4.3.1.

The quality of the connecting cable shall satisfy the thermal and mechanical requirements within the functional range.

This EC type-examination certificate as well as any future supplements thereto shall at the same time be regarded as supplements to Certificate of Conformity PTB No. Ex-91.C.1083 X.

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 1093 X

(18) Essential health and safety requirements

The tests and the favourable results these have produced reveal that the limit switch meets the requirements of directive 94/9/EC as well as those of the standards quoted on the cover sheet.

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Klausmeyer
Regierungsdirektor

Braunschweig, December 7, 2000

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

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VS-7037N
Revised 09-06
Section 20
(00-02-0185)

Shock/Vibration Control Switches Installation Instructions

Models: VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94

MURPHY

Please read the following instructions before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install the unit, and make sure installation conforms with NEC and local codes.

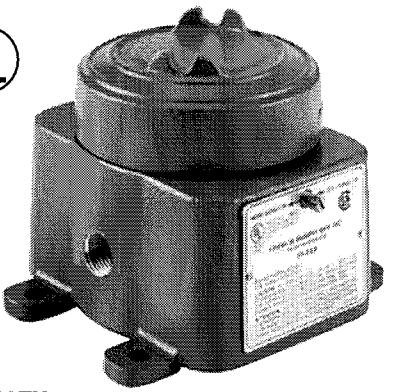
GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS MURPHY PRODUCT

- ✔ Disconnect all electrical power to the machine.
- ✔ Make sure the machine cannot operate during installation.
- ✔ Follow all safety warnings of the machine manufacturer.
- ✔ Read and follow all installation instructions.

LISTED*



Model VS2EX

Description

The Murphy shock and vibration switches are available in a variety of models for applications on machinery or equipment where excessive vibration or shock can damage the equipment or otherwise poses a threat to safe operation. A set of contacts is held in a latched position through a mechanical latch and magnet mechanism. As the level of vibration or shock increases an inertia mass exerts force against the latch arm and forces it away from the magnetic latch causing the latch arm to operate the contacts. Sensitivity is obtained by adjusting the amount of the air gap between the magnet and the latch arm plate.

Applications include all types of rotating or reciprocating machinery such as cooling fans, engines, pumps, compressors, pump jacks, etc.

Models

VS2: Base mount; non hazardous locations.

VS2C: C-clamp mount; non hazardous locations.

VS2EX: Explosion-proof; Class I, Div. 1, Groups C and D.

VS2EXR: Explosion-proof with remote reset.

VS2EXRB: Explosion-proof; Class I, Div. 1, Group B; with remote reset.

VS94: Base mount; non hazardous locations, NEMA 4X/IP66.

Remote Reset Feature (VS2EXR, VS2EXRB and VS94 only)

Includes built-in electric solenoid which allows reset of tripped unit from a remote location. Standard on VS2EXR and VS2EXRB. Optional on VS94 (options listed below).

-R15: Remote reset for 115 VAC

-R24: Remote reset for 24 VDC

Time Delay Option (VS94 only)

Overrides trip operation on start-up. For VS94 series models, the delay time is field-adjustable from 5 seconds up to 100 seconds with a 20-turn potentiometer (5 seconds per turn approximately). Options listed below:

-T15: Time delay for 115 VAC

-T24: Time delay for 24 VDC

Space Heater Options (VS94 only)

This optional space heater board prevents moisture from condensing inside the VS94 Series case. Options listed below:

-H15: Space heater for 115 VAC

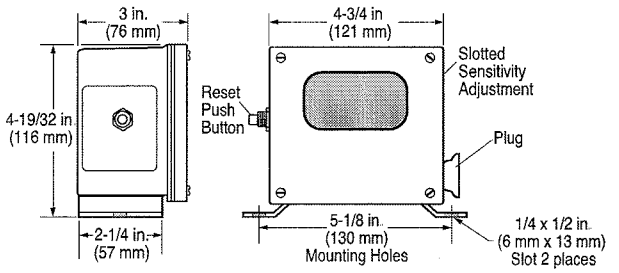
-H24: Space heater for 24 VDC

Warranty

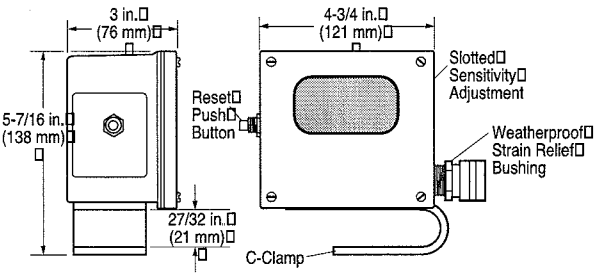
A limited warranty on materials and workmanship is given with this FW Murphy product. A copy of the warranty may be viewed or printed by going to www.fwmurphy.com/support/warranty.htm

DIMENSIONS

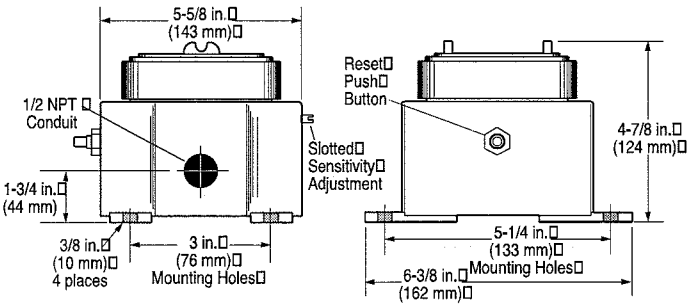
VS2



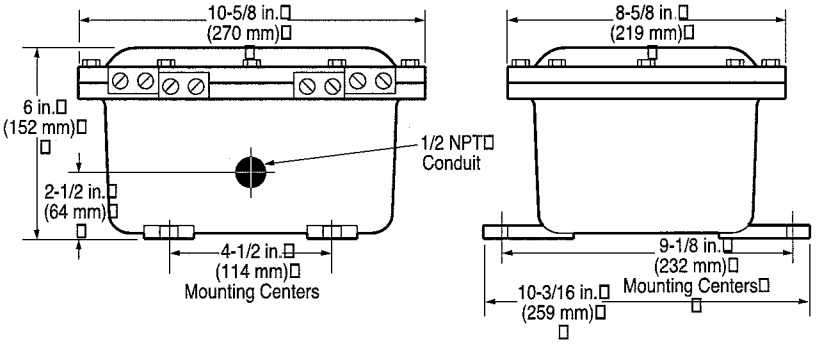
VS2C



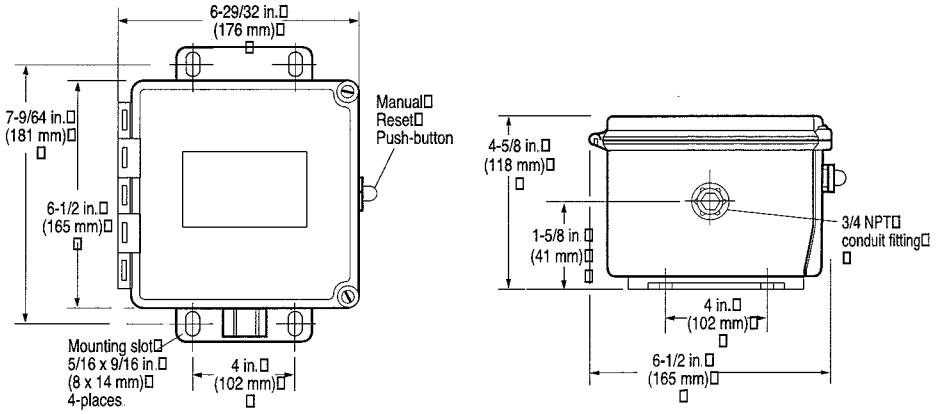
VS2EX and VS2EXR



VS2EXRB



VS94



SPECIFICATIONS

VS2 and VS2C

- **Case:** Weatherproof (equal to NEMA 3R) suitable for non-hazardous areas.
  VS2: *Base mount*
  VS2C: *C-clamp mount. Includes 45 feet (13.7 meters), 2-conductor 16 AWG, 30 strands/0.25 mm strand dia. (1.5 mm²) cable, and five cable hold down clamps.*
- **Contacts:** SPDT double make leaf contacts, 5A @ 480 VAC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS2EX

- **Case:** Explosion-proof and weatherproof aluminum alloy housing; meets NEMA 7/IP50 specifications; Class I, Division 1, Groups C & D; UL and CSA listed*
  VS2EX: *base mount.*
- **Snap-switches:** 2-SPDT snap-switches; 5A @ 480 VAC;*
  2A resistive, 1A inductive, up to 30 VDC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Normal Operating Temperature:** -40 to 140°F (-40 to 60°C).

VS2EXR

- **Case:** Same as VS2EX.
- **Snap-switch:** 1-SPDT snap-switch and reset coil; 5A @ 480 VAC;* 2A resistive, 1A inductive, up to 30 VDC.
- **Remote Reset (optional):**

Option	*Operating Current*
-R15:	*350 mA @ 115 VAC*
-R24:	*350 mA @ 24 VDC*

- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0 100 in. displacement.
- **Normal Operating Temperature:** -40 to 140°F (-40 to 60°C).

VS2EXRB

- **Case:** Explosion-proof aluminum alloy housing; rated Class I, Division 1, Group B hazardous areas.
- **Snap-switch:** 1-SPDT snap-switch with reset coil (option available for additional SPDT switch); 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.
- **Remote Reset:**

Option	*Operating Current*
-R15:	*350 mA @ 115 VAC*
-R24:	*350 mA @ 24 VDC*

- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0 100 in. displacement.

VS94

- **Case:** Polyester fiberglass reinforced; NEMA type 4 and 4X; IP66; CSA types 4 and 12.
- **Conduit Fitting:** 3/4 NPT conduit fitting connection.
- **Normal Operating Ambient Temperature:**
  0 to 140°F (-18 to 60°C).
- **Snap-switches:** 2-SPDT snap acting switches; 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0 100 in. displacement.
- **Heater (optional):**

Option	*Operating Current*
H15	*.023 A @ 115 VAC*
H24	*.12 A @ 24 VDC*

- **Remote Reset (optional):**

Option	*Operating Current*
R15	*.17 A @ 115 VAC*
R24	*.36 A @ 24 VDC*

- **Time Delay (optional):**

Option	*Operating Current*	*Standby Current*
T15	*.360 A @ 115 VAC*	*.01 A @ 115 VAC*
T24	*1.15 A @ 24 VDC*	*.01 A @ 24 VDC*

- **Time Delay/Remote Reset:** Adjustable 20-turn potentiometer from 5 seconds to 100 seconds (5 seconds per turn approximately).

*CSA and UL listed with 480 VAC rating

INSTALLATION

WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

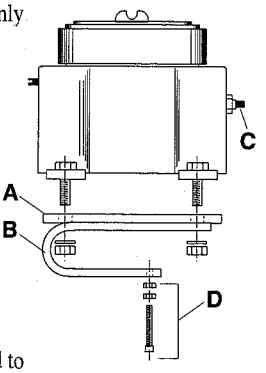
The VS2 and VS94 series shock switches are sensitive to shock and vibration in all three planes of motion - up/down, front/back and side/side. Front/back is the most sensitive (The reset pushbutton is located on the "front" of the unit). For maximum sensitivity mount the unit so that the front faces into the direction of rotation of the machine. (See Dimensions on page 2 for sensitivity adjustment location).

The VS2 and VS94 Series must be firmly attached/mounted to the machine so that all mounting surfaces are in rigid contact with the mounting surface of the machine. For best results, mount the instrument in-line with the direction of rotating shafts and/or near bearings. In other words, the reset push button should be mounted pointing into the direction of shaft rotation (see page 5). It may be necessary to provide a mounting plate or bracket to attach the VS2 and VS94 Series to the machine. The mounting bracket should be thick enough to prevent induced acceleration/vibration upon the VS2 or VS94 Series. Typically 1/2 in. (13mm) thick plate is sufficient. See illustrations on page 5 for typical mounting locations.

CAUTION: A dust boot is provided on the reset pushbutton for all series to prevent moisture or dust intrusion. The sensitivity adjustment for model VS2EX is not sealed; therefore, mounting orientation should be on a horizontal plane or with the sensitivity adjustment pointing down. Sensitivity adjustment for model VS2 is covered by a plug. The plug must be in place and tight to prevent moisture or dust intrusion.

C-Clamp Installation (VS2C model only)

A C-Clamp is supplied with the VS2C model only. The C-Clamp is shipped installed on the VS2C but must be installed on the VS2EX and VS2EXR switches.



1. The C-Clamp **(B)** will already be installed on a 1/4 in. (6 mm) thick steel mounting plate **(A)**. Bolt the VS2 switch to the mounting plate as illustrated — with four 5/16 in. bolts, nuts, and washers.
2. The mounting location should provide convenient access to the TATTLETALE® push button **(C)**.
3. The hardened set screw and nuts **(D)** are used to tighten the switch to an I-Beam or cross member such as a Sampson post of an oilwell pumpjack.

Continued on next page

All Models

WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

1. Firmly secure the unit to the equipment using the base foot mount or C-Clamp if applicable. See ***C-Clamp Installation*** page 3.

   For oilwell pumpjacks attach the VS2 and VS94 Series to the Sampson post or walking beam. See ***Typical Mounting Locations*** page 5.

2. Make the necessary electrical connections to the vibration switch. See ***Internal Switches,*** page 6 for electrical terminal locations and page 7 for typical wiring diagrams. **DO NOT EXCEED VOLTAGE OR CURRENT RATINGS OF THE CONTACTS.** Follow appropriate electrical codes/methods when making electrical connections. Be sure that the run of electrical cable is secured to the machine and is well insulated from electrical shorting. Use of conduit is recommended.

NOTE: If the electrical cable crosses a pivot point such as at the pivot of the walking beam, be sure to allow enough slack in the cable so that no stress is placed on the cable when the beam moves.

If conduit is not used for the entire length of wiring, conduit should be used from the electrical supply box to a height above ground level that prevents damage to the exposed cable from the elements, rodents, etc. or as otherwise required by applicable electrical codes. If conduit is not attached directly to the VS2 and VS94 Series switch, use a strain relief bushing and a weatherproof cap on the exposed end of the conduit. A "drip loop" should be provided in the cable to prevent moisture from draining down the cable into the conduit should the weathercap fail.

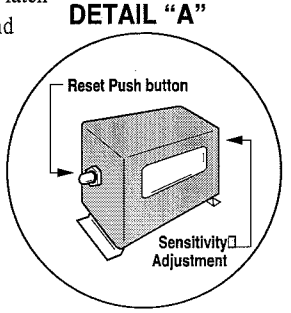
Sensitivity Adjustment

WARNING: REMOVE ALL POWER BEFORE OPENING THE ENCLOSURE. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON PERFORM ADJUSTMENTS, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES. DO NOT ADJUST SENSITIVITY WHILE THE MACHINE IS RUNNING. STAND CLEAR OF THE MACHINE AT ALL TIMES WHEN IT IS OPERATING.

All models of the VS2 and VS94 Series cover a wide range of sensitivity. Each model is adjusted to the specific piece of machinery on which it is installed. After the switch has been installed in a satisfactory location (see page 5) the sensitivity adjustment will be increased or decreased so that the switch does not trip during start-up or under normal operating conditions. This is typically done as follows:

1. **REPLACE ALL COVERS, LIDS, AND ELECTRICAL ENCLOSURES.**
2. Press the reset push button to engage the magnetic latch. To be sure the magnetic latch has engaged, observe latch through the window on the VS2 and VS2C (see DETAIL "A"). On the VS2EX, VS94 series the reset button will remain depressed meaning the magnetic latch has engaged.

DETAIL "A"

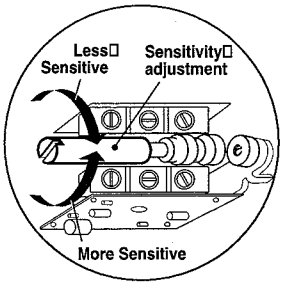


3. Start the machine.
4. If the instrument trips on start-up, allow the machine to stop. Turn the sensitivity adjustment 1/4 turn clockwise, (adjustment for VS94 and VS2EXRB models is located within the box, see DETAIL "B").

WARNING: MAKE THE AREA NON-HAZARDOUS BEFORE OPENING THE EXPLOSION-PROOF (-EX) ENCLOSURES.

Depress the reset button and restart the machine. Repeat this process until the unit does not trip on start-up.

DETAIL "B"



5. If the instrument does NOT trip on start-up, stop the machine. Turn the sensitivity adjustment 1/4 turn counter-clockwise. Repeat the start-up/stop process until the instrument trips on start-up. Turn the sensitivity adjustment 1/4 turn clockwise (less sensitive). Restart the machine to verify that the instrument will not trip on start-up.
6. Verify that the unit will trip when abnormal shock/vibration exists.

VS94 Time Delay Adjustment

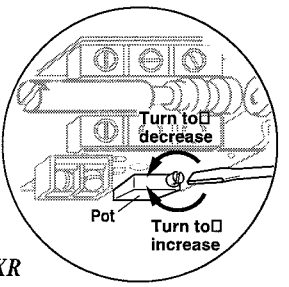
1. Apply power to the time delay circuit. (see page 7 for time delay circuit). The time delay function will be initiated.
2. Time the length of the delay with a watch. Let time delay expire. After it expires, the override circuit will de-energize the solenoid, allowing the latch arm to trip. A clicking noise is heard.

WARNING: REMOVE ALL POWER BEFORE OPENING ACCESS DOOR. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON ADJUST THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES.

3. **TURN THE POWER OFF TO RESET THE TIME DELAY CIRCUIT.**

NOTE: Allow 30 seconds bleed-time between turning the power "OFF" and "ON."

DETAIL "C"



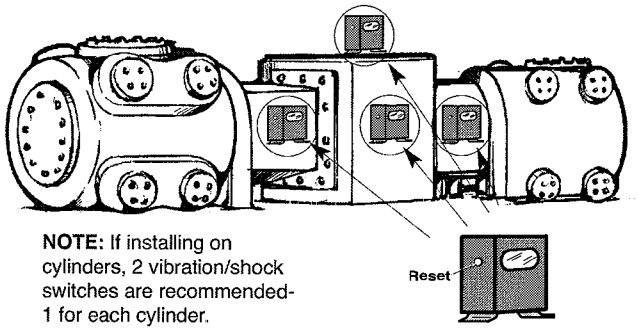
4. Locate the time adjustment pot (DETAIL "C"). The time is factory-set at the lowest setting (5 seconds approximately). To increase time, rotate the 20-turn pot clockwise as needed (5 seconds per turn approximately).
5. Repeat the above steps as necessary to obtain desired time delay.

NOTE: An external time delay can be used with the remote reset feature of the VS2EXR series to provide a remote reset and override of the trip operation on start-up. Time delay must automatically disconnect after equipment start-up.

TYPICAL MOUNTING LOCATIONS

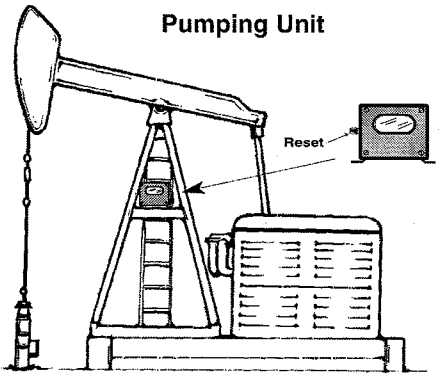
NOTE: These are typical mounting locations for best operation. Other mountings are possible. See *Installation* section on page 3.

2-Throw Balance-Opposed Compressor

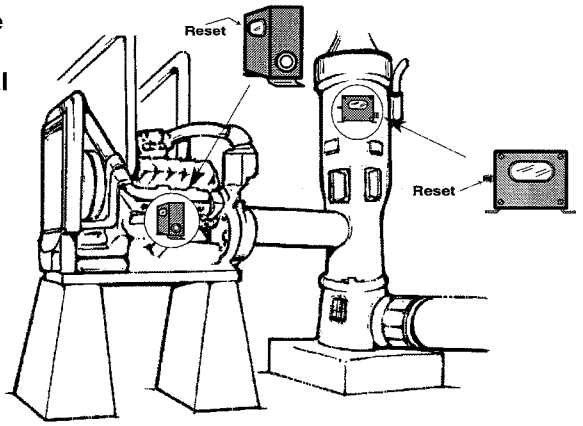


NOTE: If installing on cylinders, 2 vibration/shock switches are recommended- 1 for each cylinder.

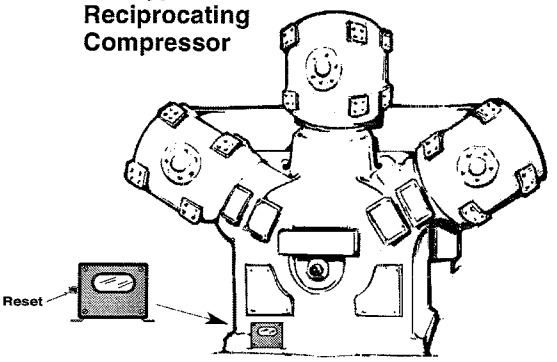
Pumping Unit



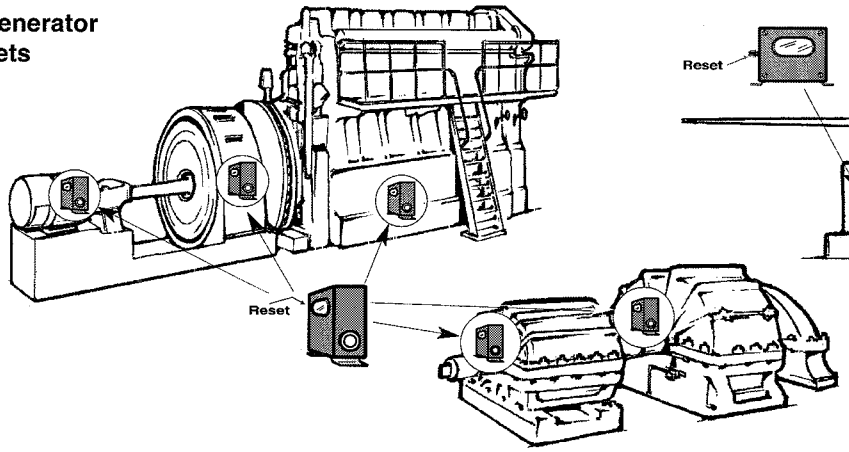
Engine and Vertical Shaft Pump



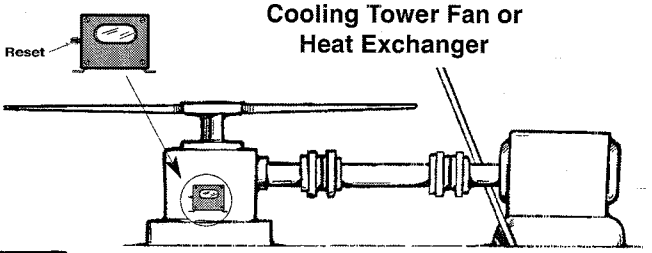
"Y" Type Reciprocating Compressor



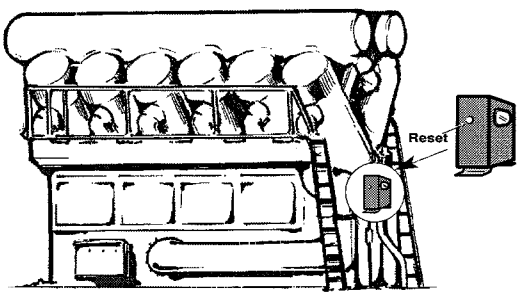
Generator Sets



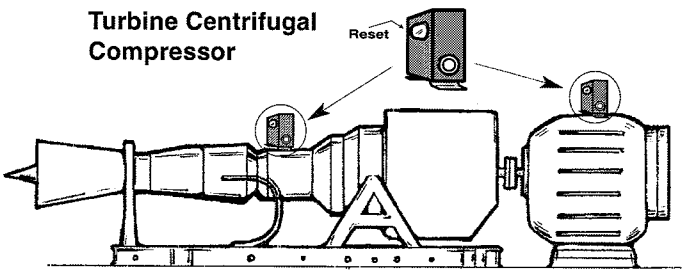
Cooling Tower Fan or Heat Exchanger



Engine Compressor

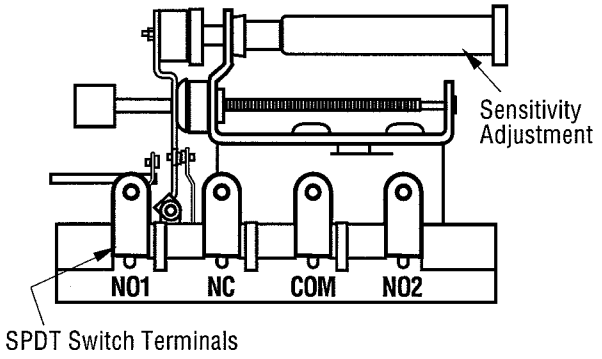


Turbine Centrifugal Compressor

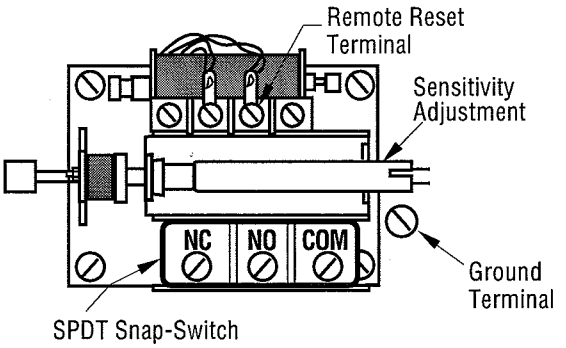


INTERNAL SWITCHES

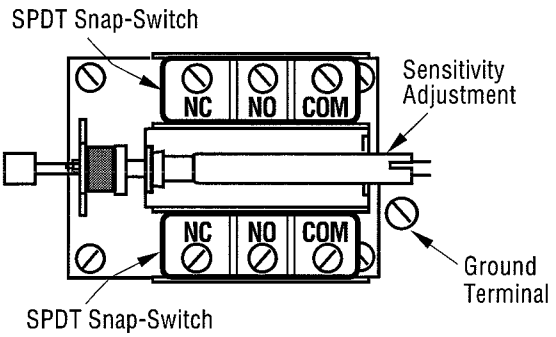
VS2 and VS2C



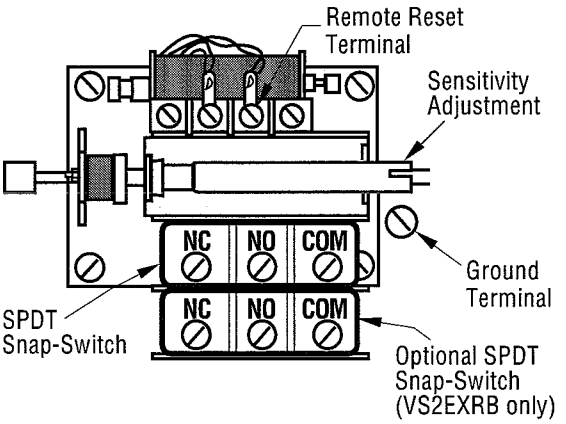
VS2EXR



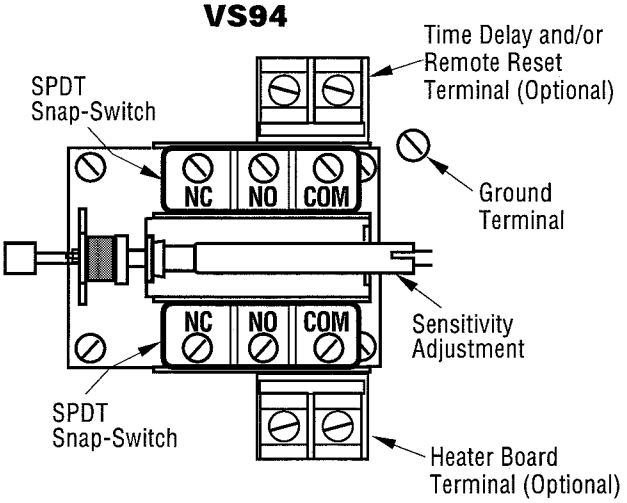
VS2EX



VS2EXB and VS2EXRB



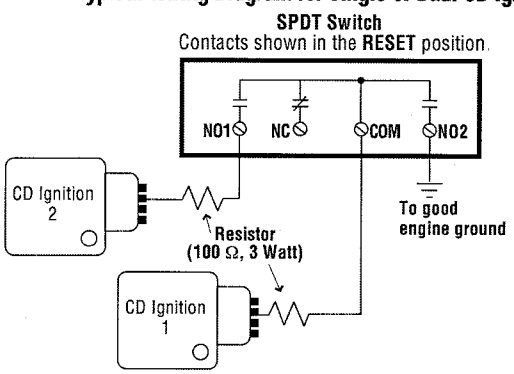
VS94



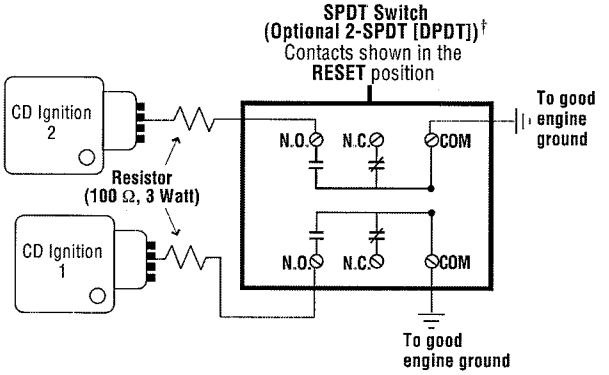
ELECTRICAL

WARNING: REMOVE POWER BEFORE OPENING THE UNIT (ACCESS DOOR). STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING OPERATION. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON INSTALL AND WIRE THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND APPLICABLE CODES.

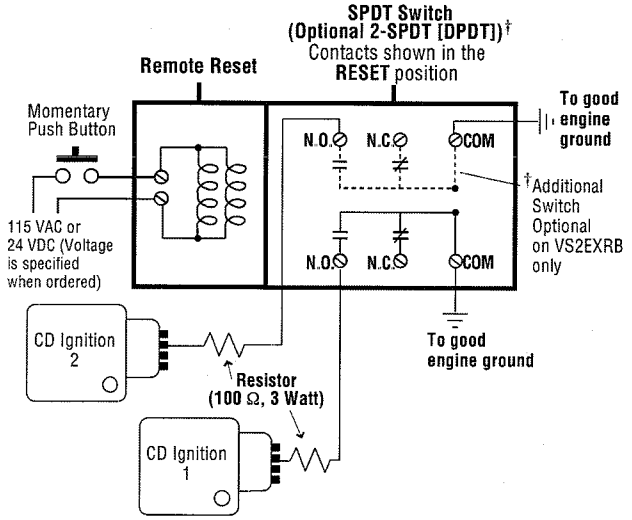
VS2 and VS2C
Typical Wiring Diagram for Single or Dual CD Ignition



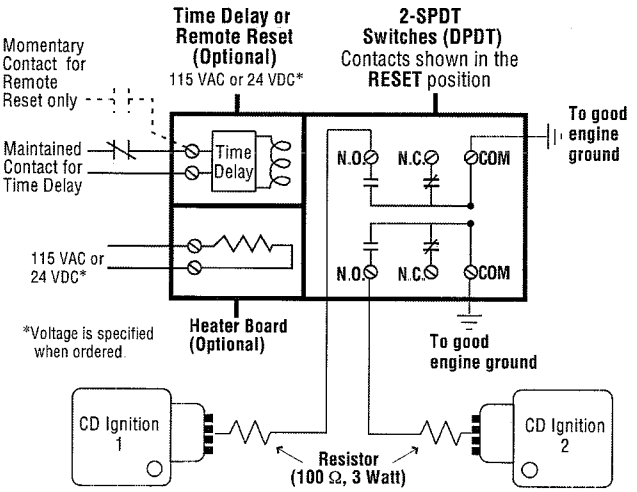
VS2EX
Typical Wiring Diagram for Single or Dual CD Ignitions



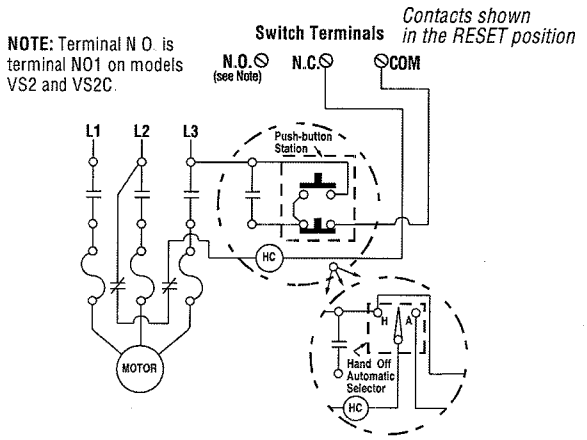
VS2EXR and VS2EXRB
Typical Wiring Diagram for Single or Dual CD Ignitions



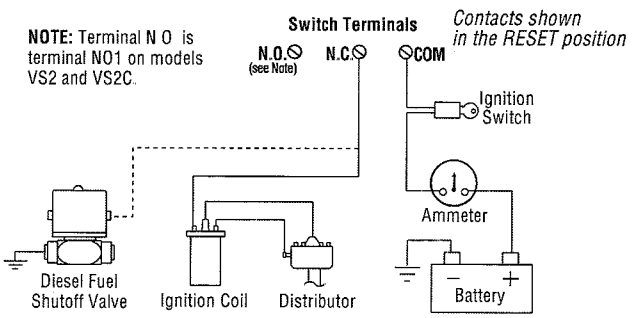
VS94
Typical Wiring Diagram for Single or Dual CD Ignitions



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94
Typical Wiring Diagram for Electric Motors



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94
Typical Wiring Diagram for Distributor Ignition or Diesel



SERVICE PARTS

PART NO.	DESCRIPTION
VS2	
20000030	Movement assembly
20000031	Glass and gasket assembly
20000032	Reset push button assembly
VS2C	
20000030	Movement assembly
20000031	Glass and gasket assembly
20000032	Reset push button assembly
20050021	Mounting clamp
20000185	VS2C 5-clamp hardware package assembly
20050465	2-Conductor electrical cable, 45 feet (13 7 meters)
VS2EX	
20010091	Movement assembly
20050087	Cover
00000309	Cover gasket
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000289	C-clamp conversion mounting kit
VS2EXR	
20000262	Movement assembly
20050087	Cover
00000309	Cover gasket
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000049	Reset solenoid assembly (115 VAC)
20000234	Reset solenoid assembly (24 VDC)
20000289	C-clamp conversion mounting kit

PART NO.	DESCRIPTION
VS2EXRB	
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000057	*Inside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000058	*Outside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000287	***Outside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20000290	***Inside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20050077	Adjustment shaft
20000262	Movement assembly
20000049	Reset solenoid assembly (115 VAC)
20000234	Reset solenoid assembly (24 VDC)
VS94 Series	
25050506	Dust boot
00000232	Conduit fitting
20010090	Snap-switch and insulator kit (1 switch per assembly) **prior to September 1, 1995.****
20000288	**Snap-switch and insulator kit (1 switch per assembly) for models manufactured on September 1, 1995 or later.*****

* If no date code is found, refer to the old switch. Models with date 0895 and before use old switch. Dated 0995 after, use straight snap-switch arm, no rollers

** Models dated Q1 thru Q8 (formed snap-switch arm and rollers).

***Models date coded Q9 thru Q12 and R1 thru R12 (straight snap-switch arm, no rollers).

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In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time

Document No.: PE-S-069-03-03

CERTIFICATE OF ORIGIN

Equipment:	Centrifuge
Model:	DE-1000™ GBD, DE-1000™ FHD, DE-1000™ VFD
Characteristics:	0-600VAC, 50/60Hz, 3PH

Derrick Corporation acknowledges that the above set-forth product is manufactured in the United States of America as of the data of this certificate. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

Date: 29-December-2011

Signature: Jennifer J. Polanowski
Derrick Corporation

Document No.: PE-S-009-08-00

CERTIFICATE OF QUALITY

Equipment:	Centrifuges
Model:	DE-1000™ GBD, DE-1000™ FHD, DE-1000™ VFD, DE-7200 VFD
Characteristics:	0-600VAC, 50/60Hz, 3PH

Derrick Corporation acknowledges that the above set-forth product conformed to the requirements for the applicable purchase order at the time of its original shipment by Derrick Corporation in that all construction materials and components were new and unused, were manufactured for this product, and that it was free of any known defects as to their design, material and workmanship. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

Jennifer J. Polanowski

Date: 29-December-2011

Signature: Jennifer J. Polanowski
Derrick Corporation

SHIPPING FINAL INSPECTION AND RUN TEST CERTIFICATE

Equipment:	Centrifuges
Model:	DE-1000™ GBD, DE-1000™ FHD, DE-1000™ VFD, DE-7200 VFD
Characteristics:	0-600VAC, 50/60Hz, 3PH

The product listed above was inspected and found to be in conformance with Derrick Corporation's internal coating, run test, and assembly inspection documents that were required for the type of equipment manufactured in accordance with the Derrick quality system. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

Date: 29-December-2011

Signature: Jennifer J. Polanowski
Derrick Corporation

DERRICK® CORPORATION

Doc # PE-S-036-02-06
Date: 20-January-2011

CERTIFICATE OF CONFORMANCE

Equipment:	Mining & Oilfield equipment manufactured specifically for Hazardous Location Areas including but not limited to: Flo-Line® Cleaners, Flo-Line® Primers, Agitators, Vacu-Flo™ Degassers, DE-1000™ Centrifuges, Centrifugal Pumps, Flo-Line Scalpers™ etc.
Name and Address of Manufacturer:	Derrick Corporation 590 Duke Road Buffalo, NY 14225
Rating and Principle Characteristics:	0-600 VAC, 50/60Hz, 3PH
Model / Type Ref:	Various
Additional Information:	None

This product was found to be in conformance with:

U.L. listed for hazardous locations Class I, Division 1, Groups C & D, which is similar to equipment marked as II 2G Ex d IIB T3 for Zone 1 areas. Assembled in accordance with National Electrical Code (NEC) – articles 500 thru 506 (hazardous locations) where applicable.

Additionally:

Derrick Corporation certifies that the above-listed equipment for the referenced order conformed to the requirements of the specified order at the time of its original shipment by Derrick Corporation in that: all construction materials and components were new and unused, manufactured for this equipment, and that the goods were free of any known defects as to their design, material and workmanship. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the above-listed equipment.

Signature: For Thomas Silvestrini